THE

JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

[REGISTERED AS A NEWSPAPER.]

VOL. XXV. No. 629.] LONDON, JUNE 1, 1875. [27TH YEAR.] Price 6d.

RAMSAY'S NEWCASTLE CANNEL COAL. Analysis—10,000 cubic feet of gas per ton of coal; 26-candle gas; 13¼ cwt. coke per ton of coal.
The London Exhibition in 1851 was lighted with gas made from Ramsay's Cannel.
RAMSAY'S PATENT CONDENSED COKE.
DO. GARESFIELD COKE.

RAMSAY'S FIRE-CLAY ARTICLES.
GAS-RETORTS, introduced 1828. FIRE-BRICK WORKS, established 1804. FIRE-CLAY SANITARY PIPES. CHIMNEY-TOPS, and all Goods made of Fire-Clay. The Fire-Clay is worked from Blaydon Main Colliery, is of excellent quality, and no expense spared in perfecting every article. The FIRE-BRICKS (marked "RAMSAY") are to be seen in all parts of the world, and the Works are the most extensive in the Kingdom.
Manufactories—Derwenthaugh, Swalwell, and Hebburn Quay, near Newcastle-on-Tyne; and London Wharves—Falcon Wharf, No. 80, Bankside; and Honduras Wharf, Cubit Town. Large stocks kept.
Address G. H. RAMSAY, NEWCASTLE-ON-TYNE.

GENUINE TORBAY PAINT
AND
SPECIAL GASOMETER PAINT
(Mixed ready for use).
These Paints are now used in 100 Country Gas-Works, and by all (but one) of the London Gas Companies, on Gasholders, Scrubbers, Purifiers, &c. They will cover tar effectually. Also used by the Admiralty, War Office, Railway Companies, Founders, &c.
They prevent and arrest rust, and protect iron from the action of water, sulphurous and gaseous exhalations.
The covering powers are considerably greater than those of any other Paint.—*See "Engineer," Nov.* 2, 1866.
STEVENS & CO.,
(SUCCESSORS TO SAMUEL CALLEY. ESTABLISHED 20 YEARS.)
21, GT. WINCHESTER ST., LONDON.
WORKS: BRIXHAM, TORBAY.

PROUD'S
SPECIALITIES IN WOOD GRIDS
FOR
PURIFIERS & SCRUBBERS
MADE FROM THE BEST QUALITY
OF
WELL-SEASONED PLANKS.
BROOKFIELD WORKS,
103, ICKNIELD STREET EAST, BIRMINGHAM.

COWEN'S PATENT FIRE-CLAY RETORTS.
JOSEPH COWEN and CO.,
BLAYDON BURN, BLAYDON-ON-TYNE,
Were the only parties to whom a PRIZE MEDAL was awarded at the GREAT EXHIBITION of 1851, for "GAS-RETORTS and OTHER OBJECTS in FIRE-CLAY," and they were also awarded at the INTERNATIONAL EXHIBITION of 1862, the PRIZE MEDAL for "GAS-RETORTS, FIRE-BRICKS, &c., for EXCELLENCE of QUALITY."
J. C. and Co. have been for many years the most extensive Manufacturers of Fire-Clay Retorts and Fire-Bricks in the Kingdom. Orders for Fire-Clay Retorts of all shapes and dimensions, and to fit any shaped Mouthpiece, Fire-Bricks, and every other article in Fire-Clay, are promptly executed at their Works as above.
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JOS. COWEN & Co. are the only Manufacturers of FIRE-BRICKS and CLAY RETORTS at BLAYDON BURN.

JOHN RUSSELL AND CO.,
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AND
THE ALMA WORKS, WALSALL.
Established at the commencement of Gas Lighting.
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J. R. and Co. make all kinds of Tubes and Fittings for Gas, Steam, and Water; Gun-Metal Cocks, Stocks, and Dies; Galvanized Tubes and High-Pressure Tubes, &c.
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Roofs, Girders, and Bridges, and General Smith's Work.
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RETORTS SET, AND GUARANTEED TO BURN OFF A CERTAIN AMOUNT OF COAL, OR ELSE NO MONEY TAKEN FOR THE CONTRACT.
PLANS ON APPLICATION.
Retort-Setters sent to all parts of Europe and America.
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DUKE OF HAMILTON'S
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PATENTEES OF THE
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For the English Government, and for the Government of the Netherlands;
MAKERS OF THE DUPLICATE COPY
Presented by Her Majesty's Government to the French Government;
AND MANUFACTURERS OF
IMPROVED
DRY GAS-METERS,
Warranted to Measure correctly, and not to vary.
RANELAGH WORKS, RANELAGH ROAD, PIMLICO, LONDON, S.W.;
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G. G. and Co. have just received the only Medal awarded for Gas-Meters at the Vienna International Exhibition.

SILVER MEDAL, PARIS EXHIBITION, 1867.

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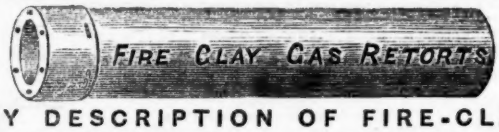
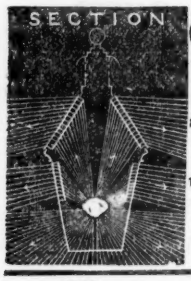
MANUFACTURERS of FIRE-BRICKS, LUMPS, & TILES,



AND EVERY DESCRIPTION OF FIRE-CLAY GOODS.

N.B.—A Stock of 15 and 18 in. CIRCULAR RETORTS always on hand. Other kinds made to order on short Notice.



THE PATENT
CATOPTRIC LAMP
Is now in use in Moorgate Street, Cheapside, and Trafalgar Square, and has been in successful operation upon Waterloo Bridge since Oct. 7, 1871.
T. A. SKELTON, 37, Essex St., Strand, LONDON, INVENTOR AND PATENTEE.

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GAS ENGINEER AND CONTRACTOR FOR THE ERECTION OF GAS-WORKS,
AND FOR THE
SUPPLY OF RETORTS, FIRE-BRICKS, CAST-IRON MAINS,
AND ALL MATERIALS FOR GAS MANUFACTURE AND DISTRIBUTION.

1862.

PATENT ANTIMONY PAINT.

MADE ONLY BY

GEORGE HALLETT & CO.,

296, ROTHERHITHE, LONDON, S.E.

CLASS II.

This Paint having been in general use over thirteen years (especially in some of the principal Gas-Works), and proved itself the best light-coloured Paint produced or resisting the influence of vitiated atmospheres, it is important that its qualities should be more widely known.

It is not discoloured like white lead in a sulphuretted atmosphere, nor washed off like white zinc; and its light colour reflecting heat, produces much less expansion of gas in holders painted with it than with dark colours, besides rendering them much more sightly. Its specific gravity is so much below white lead that the same weight will cover one-third more surface, while it is equal in body; and its price being about the same (30s. per cwt.), it is actually one-third cheaper. From experience, its manufacture is greatly improved, and it is quite suitable for all purposes in which white lead is employed.

The following Gas Companies in London have used the Paint for years—viz., The Gaslight and Coke, Imperial, Independent, City of London, Commercial, London, and Surrey Consumers.

N.B.—Antimony Paint, COVERING SO MUCH MORE WORK, costs about 20s. per cwt., as compared with White Lead at 30s. per cwt.; a similar economy arises from its use in Steam and Gas Joints, for which purpose it is superior to White Lead.

SPECIAL DRIERS FOR ANTIMONY PAINT SUPPLIED.

TRADE MARK.

THE MEDAL FOR 1862.

The only Prize Medal awarded for TUBES & FITTINGS.

CROWN TUBE-WORKS,

WEDNESBURY, STAFFORDSHIRE.

WAREHOUSE: SOUTHWARK STREET, LONDON.

JAMES RUSSELL & SONS, LIMITED,

PATENTEES & FIRST MAKERS OF WROUGHT-IRON TUBES,

ONLY MAKERS OF HOMOGENEOUS METAL TUBES.

MANUFACTURERS OF

TUBES and FITTINGS for GAS, STEAM, and WATER;
LAP-WELDED, LOCOMOTIVE, MARINE, and other BOILER TUBES;
HYDRAULIC TUBES, BEDSTEAD TUBES, WELL TUBES, TELEGRAPH POSTS, COILS, &c.;
GAS-FITTERS TOOLS, VALVES, COCKS, &c.

THOMAS PIGGOTT & CO.,

(Established 1822,)

SPRING HILL, BIRMINGHAM.

MANUFACTURERS OF

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CAST & WROUGHT IRON TANKS FOR DITTO;

PURIFIERS, CONDENSERS, SCRUBBERS, RETORTS, VALVES;

IMPROVED WROUGHT-IRON RETORT-LIDS, CROSS-BARS, & SCREWS;

AND GAS APPARATUS OF EVERY DESCRIPTION.

SOLE MANUFACTURERS OF LIVESEY'S PATENT GASHOLDER MAN-LID,

By use of which Man-lid, inlet and outlet pipes can be examined and cleansed without loss of gas in crown of holder, or ingress of atmospheric air.

ROOFS, GIRDERS, BRIDGES, AND BOILERS OF ALL KINDS.

Drawings, Specifications, and Estimates supplied on application.

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JOSEPH AIRD,

WELLINGTON TUBE-WORKS, TIPTON, STAFFORDSHIRE,

MANUFACTURER OF

EVERY DESCRIPTION OF TUBING, GAS, STEAM, HYDRAULIC TUBES AND FITTINGS,
EITHER BLACK, GALVANIZED, OR ENAMELLED HOT WATER TUBES AND FITTINGS,
CORE BARS, COILS, COCKS (IRON OR BRASS),
CHANDELIERS, &c., GAS-FITTERS' TOOLS, GAS TONGS, STOCKS, TAPS, DIES, &c., &c.,
HANDRAIL TUBINGS, IRON AND BRASS, PLAIN OR TWISTED,
TELEGRAPH TUBES OR POLES, &c., &c.

THE

PATENT "UNIVERSAL" STEAM PUMP

WAS AWARDED, AT THE

VIENNA EXHIBITION, 1873,

THE GRAND PRIZE "MEDAL OF PROGRESS."

AT LILLE—GOLD MEDAL - - - - 1874. AT MANCHESTER—SILVER MEDAL - 1874.

OPINIONS OF THE PRESS.

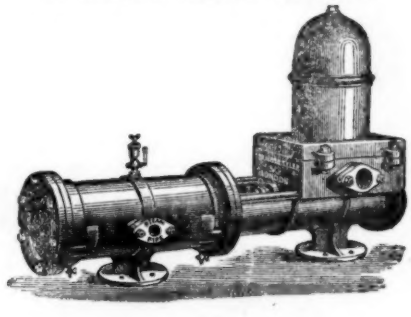
"The simplest machine of its kind."—*Engineering.*

"Remarkable for its simplicity and ease of action."—*Daily Telegraph.*

"None that we have noticed work so quietly."—*The Engineer.*

"Nothing invented in hydraulic steam power half so cheap and effectual."—*Griffith's Iron Trade Exchange.*

NO TAPPET VALVES OR GEAR.



IN USE IN SOME OF

THE PRINCIPAL GAS-WORKS IN LONDON, SHEFFIELD, PENISTONE, &c.,

FOR

TAR AND AMMONIACAL LIQUORS.

ONE SELECTED FROM AMONGST MANY TESTIMONIALS RECEIVED BY H. T. & CO.:—

"*Ardwick Bridge Chemical Works, Manchester, Oct.* 28, 1872.

"Sir,—The 'Universal' Steam Pump obtained from you, and which has been employed during the last six months pumping caustic soda at these works, still continues working satisfactorily,

"Yours truly,

(Signed) "PETER HART, *Manager.*"

SOLE MAKERS,

HAYWARD TYLER & CO.,

84 and 85, UPPER WHITECROSS STREET, LONDON, E.C.

GAS PURIFICATION & CHEMICAL Co., LIMITED,

(Successors to JOHN WILLIAM O'NEILL & CO.,)

Offices—PALMERSTON BUILDINGS, OLD BROAD STREET, LONDON, E.C.,

CONTRACTORS FOR GAS PURIFICATION BY OXIDE OF IRON.

The superiority of the material supplied by this Company is generally recognized, and it is now in use in nearly all the London and most of the large Provincial Gas-Works.

JOHN WILLIAM O'NEILL, SAMUEL H. JOHNSON, } Joint Managing Directors.

JOHN WRIGHT AND CO., ESSEX WORKS, BIRMINGHAM,

Beg to call the attention of MANAGERS and DIRECTORS of GAS COMPANIES to the following letter which they have lately received.

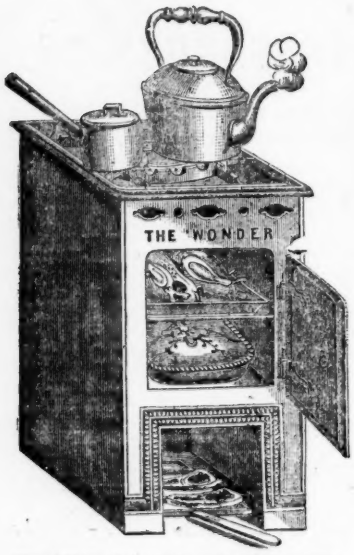
COPY OF LETTER RECEIVED FROM MAGNUS OHREN, Esq.

Crystal Palace District Gas Company, Lower Sydenham, S.E.

To Messrs. John Wright and Co., Essex Works, Birmingham.

Dear Sirs,—In reply to your inquiries, I am glad to state that the use of GAS COOKING AND HEATING STOVES has been a complete success here. We have several hundred in use in our districts. We also find it advantageous to let out Stoves at a small rental. We have now 275 Stoves at rent.

The Stoves you make I can with confidence recommend, having so many in use, and giving satisfaction. I need scarcely point out to you the advantage to Gas Companies to recommend the use of Gas Stoves to their Gas Consumers, even where they do not supply them on sale or rent, as the use of Gas Stoves brings day consumption, and thus the Company make a profit by day as well as by night.—I am, dear sirs, yours faithfully, MAGNUS OHREN.



Size, 25½ in. high; 14 in. wide; 12½ in. back to front.

Price 50s., complete with Pan and Gridiron.

GAS HEATING STOVES

(TERRA COTTA AND IRON).

THE CHEERFUL STOVE.

COOKING STOVES.

BREAKFAST COOKERS.

BATHS HEATED by GAS

GAS STOVES

For Boiling, Broiling, Preserving, Heating Flat Irons, and for all other Domestic Purposes.

Gas Companies and the Trade who have not our Illustrated Catalogue are respectfully requested to apply for same.

A LIBERAL DISCOUNT to the TRADE.

No. 4003.

THE CHEERFUL GAS STOVE, with Copper Reflector, Has all the appearance of a Bright Fire.

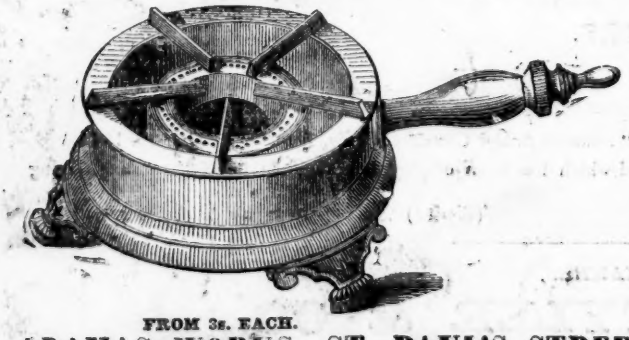
PRICE from 32s.

PRIZE MEDALS—1862, 1867, 1871, 1874.

SIDNEY LEONI AND CO.,

SOLE LICENSEES AND AGENTS FOR GREAT BRITAIN FOR

GIROUD'S PATENT RHEOMETER.



FROM 3s. EACH.

This Instrument is easily fixed under any Burner; it regulates the volume of Gas to be consumed, notwithstanding the Size of the Burner or the Variation of Pressure.

Full particulars on application, also Pamphlets on the "ADVANTAGES OF COOKING AND HEATING BY GAS." With Illustrations, &c., of the latest and most improved GAS KITCHENERS, GRILLERS, COOKING STOVES, REGISTERED BOILING STOVES (See Margin); also the NEW SAFETY PATENT TUBULAR GAS BOILERS.

LIBERAL TERMS TO THE TRADE.

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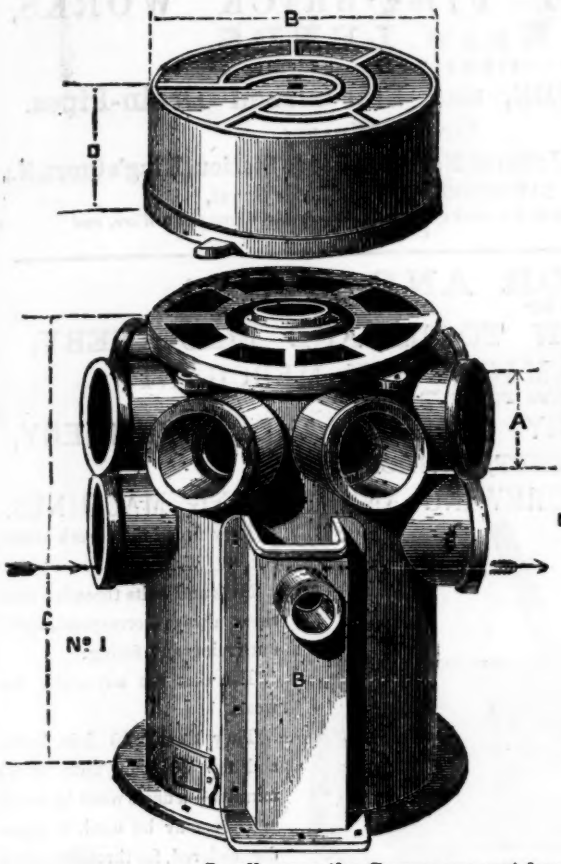
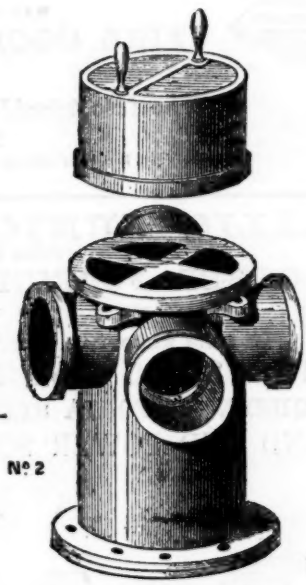
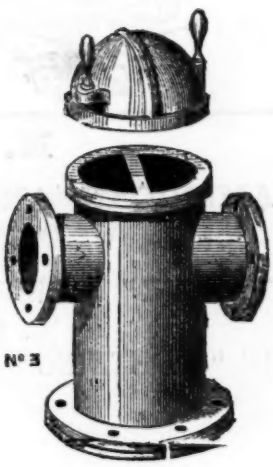
MESSRS. NEWTON, CHAMBERS, & CO.,

THORNCLIFFE IRON-WORKS, NEAR SHEFFIELD.

IMPROVED CENTRE-VALVES.







THORNCLIFFE
IMPROVED BYE-PASS VALVE.
SIZES FROM 3 INS. UPWARDS.

THORNCLIFFE
IMPROVED STOP-VALVE.
SIZES FROM 3 INS. UPWARDS.

Sizes of the THORNCLIFFE IMPROVED CENTRE-VALVE.

	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.	Ins.
A. Bore of Pipe. . .	4 ..	5 ..	6 ..	7 ..	8 ..	9 ..	10 ..	12
B. Diameter of Body.	16 ..	20 ..	23 ..	26 ..	28 ..	31 ..	34 ..	40
C. Height of Tank .	33 ..	35 ..	38 ..	43 ..	46 ..	48 ..	51 ..	56
D. Depth of Cover .	8 ..	9 ..	10 ..	11 ..	12 ..	13 ..	14 ..	16
Total Height . .	44 ..	44 ..	48 ..	54 ..	58 ..	61 ..	65 ..	72

In all cases the Covers are cast heavy enough to resist any required pressure.

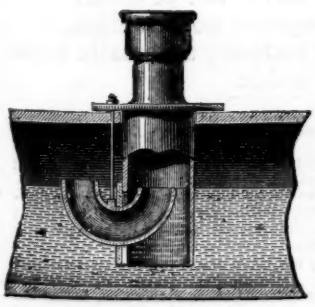
The advantages derived from the adoption of these Valves are so manifest and cardinal that in the immediate character of the change—the simplicity of the machine—the facility affording for cleaning out connexions between Valve and Purifier—the perfect collection and delivery by suitable overflow of the ammonia, at a greatly diminished depth from ground-line over the old form of Valve—the advantage of connecting on the same level, and at any angle, or opposite to each other, the inlet and outlet pipes without dip or rise—the clear acquisition of space in the purifying-house, by being able to place the boxes nearer together, the new Valve being entirely under the floor—and lastly, though of the greatest importance, the passage of crude and unpurified gas during the change is minimized to the merest fraction, thus preventing the fouling by impure gas the delicate machinery and easily affected exposed movements of the station-meter, thereby preventing the introduction of the enemy (unpurified gas) into the gasholder. Also a dead abutment is offered to all back pressure, imparting thereby to the gauges, governors, and hydraulic seals, a steadiness of action never realized with the once famous, but now fast becoming obsolete, Hydraulic Centre-Valve.

N., C., and Co. also Manufacture and Erect

PURIFIERS, CONDENSERS, SCRUBBERS, GASHOLDERS, ROOFS,

And every description of Gas Machinery.

TENDERS GIVEN FOR WORK FIXED COMPLETE IN ANY PART OF THE KINGDOM.



DIP-PIPE, No. 1.

Messrs. N., C., and Co. are also the Sole Agents for

HAWKINS' PATENT SELF-ACTING HYDRAULIC DIP-PIPES.

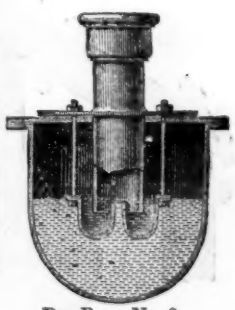
By their use the whole of the pressure caused by the Seal in the Hydraulic Main is entirely avoided, thus securing the many advantages long sought for.

Over 50 Gas Companies have already been supplied with them, many of which have been using them throughout their entire works continuously for over two years.

They can be applied to existing Hydraulic Dips, and at a very small cost.

They seal themselves in the same manner as the ordinary dip-pipes, therefore they are not likely to get out of repair.

By the aid of the adjusting screws they can be made to work on the old principle at pleasure.



DIP-PIPE, No. 2.

FOR PRICES, TESTIMONIALS, &c., APPLY TO

Messrs. **NEWTON, CHAMBERS, & CO.**, Thorncliffe Iron-Works, near Sheffield, Sole Agents;

OR TO THE PATENTEE,

J. G. HAWKINS, NEEPSEND GAS-WORKS, SHEFFIELD.

Established

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JOSEPH CLIFF & SON,

THE ORIGINAL

WORTLEY FIRE-BRICK WORKS,

NEAR LEEDS,

MANUFACTURERS OF ALL DESCRIPTIONS OF

FIRE GOODS, and Salt-Glazed Drain-Pipes.

LONDON WHARF:

Wharf No. 4, inside Great Northern Goods Station, King's Cross, N.;

LIVERPOOL—1, Back Leeds Street,

Where is always kept a Stock of Retorts, Fire-Bricks, Terra Cotta Ware, and Drain-Pipes.

M. SELIG JUNIOR AND CO.,

IMPORTERS OF

AMERICAN AND OTHER FOREIGN TOOLS AND MACHINERY,

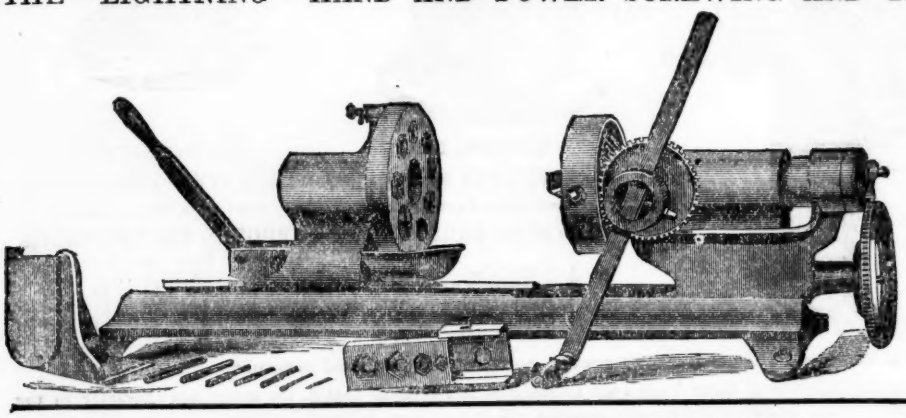
WHOLESALE AND EXPORT MACHINERY MERCHANTS,

SOLE EUROPEAN AGENTS FOR THE

"TANITE" COMPANY'S SOLID EMERY WHEELS AND MACHINERY,

85, QUEEN VICTORIA STREET, LONDON, E.C.

THE "LIGHTNING" HAND AND POWER SCREWING AND TAPPING MACHINES.



They finish their work at one cut.

Nuts and bolts threaded with them always correspond, without trying and fitting.

The dies are adjustable for wear.

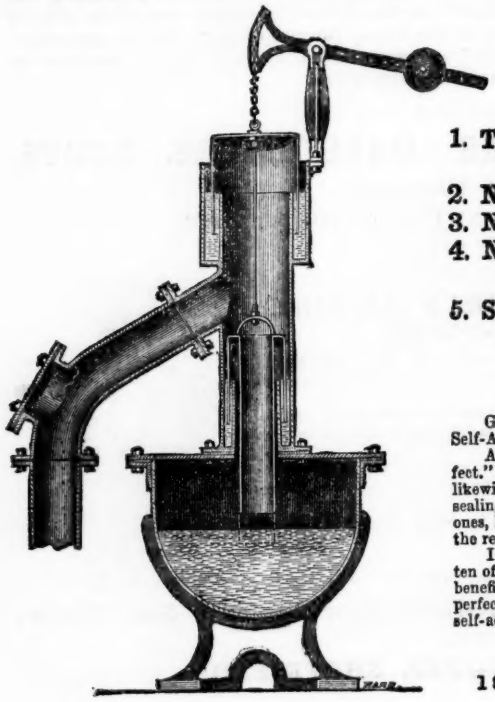
They thread 30 ¾-in. bolts, and tap 30 ¾-in. nuts, in 40 minutes—a day's work by hand.

They may be used, if pipe-dies ordered, for threading pipes as well.

SELF-ACTING REMOVABLE DIP-PIPE,

PATENTED BY

CHANDLER & STEVENSON.



ADVANTAGES.

1. There is no pressure on the Retorts.
2. No deposit of Carbon.
3. No scurfing is required.
4. Never a choked Ascension-Pipe.
5. Saves Fuel and Wear and Tear.
6. Gets 10 per cent. more Gas out of the Coal, and a higher Illuminating Power.
7. Is never out of order.
8. Requires no attention.
9. Is perfectly automatic in its action.

TESTIMONIAL.

Metropolitan District Asylum, Caterham, Surrey, Dec. 14, 1874.

MESSRS. CHANDLER AND STEVENSON.

GENTLEMEN,—I have much pleasure in bearing testimony to the complete working of your "Patent Self-Acting Dip-Pipes," which have now been in constant operation over three months.

As regards the action of the apparatus, I can describe it no better than by calling it "simply perfect." Immediately the retort is charged and the lid secured, the small holder rises, which lifts the Dip; likewise the instant the gas is permitted to escape at the mouthpiece the holder falls, thus perfectly sealing the Dip. I am fully convinced of the superiority of these Self-Acting Dips over Non Self-Acting ones, having experienced the fact that stokers do occasionally neglect to unseal the Dip after charging the retort, thereby causing a waste or loss.

I feel that it is quite unnecessary for me to say more on the subject, excepting that, having had ten of Messrs. Chandler's Dip-Pipes in use more than one year, and having experienced the great benefits derived thereby, inasmuch as the yield of gas from the coal is greatly increased, and the retorts perfectly free from carbon and other advantages, and seeing that the same Dip has been made perfectly self-acting by the second patent, I feel convinced that this is the right thing.—Yours obediently,

W. CRICKMAY, Resident Engineer.

For terms of use and cost, apply to Mr. G. W. STEVENSON,

19, GREAT GEORGE STREET, WESTMINSTER.

TANGYE BROTHERS AND HOLMAN,

LAURENCE POUNTNEY LANE, LONDON, E.C.,

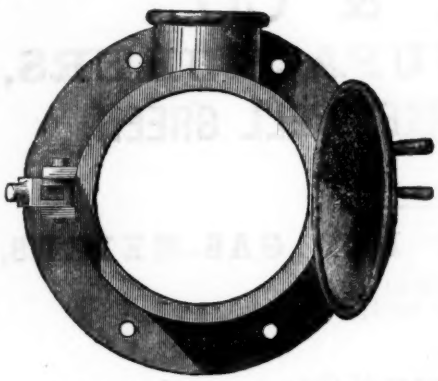
SOLE MAKERS OF

MORTON'S PATENT SELF-SEALING RETORT-LIDS,

WITH

HOLMAN'S NEW PATENT BRACKETED CROSS-BARS,

ANTI-FRICTION CATCHES, AND ECCENTRIC FASTENINGS.

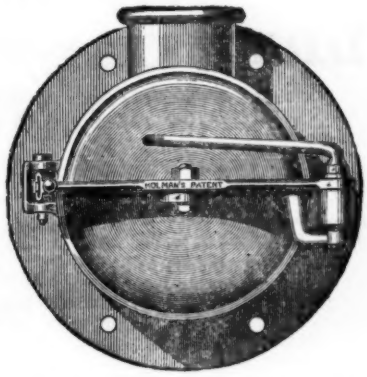


NO LUTING.

NO DUPLICATE LIDS REQUIRED.

INSTANTANEOUS SEALING EFFECTED.

HOLMAN'S NEW SELF-SUSTAINING CROSS-BAR ENSURES FREEDOM OF JOINT AND MAINTAINS PARALLEL POSITION OF THE LIDS.



Since their introduction in 1869, these Patent Retort-Lids have been thoroughly tested (rigid cast iron is now successfully employed), nearly 15,000 being in use at various Gas-Works in London and the Provinces, among which may be mentioned:—

The Gaslight Co., Beckton (where, by the end of 1875, nearly 4000 will be in use).
" Gaslight Co., Bow Common.
" Gaslight Co., Silvertown.
" Gaslight Co., Lupus Street.
" London Gaslight Co.
" Independent do.
" Phœnix do.
" South Metropolitan Gaslight Co.
" Commercial do.
" Imperial do.
" West Ham Gas Co.
" Gas-Works, Barnet.

The Gas-Works, Royal Arsenal, Woolwich.
" do. Lower Sydenham.
" do. Brentford.
" Consumers Gas Co., Woolwich.
" Alliance and Dublin Gas-Works.
" Edinburgh do.
" Manchester Corporation do.
" Salford do. do.
" Rochdale do. do.
" Liverpool Gas-Works.
" Birmingham do.
" Birkenhead do.
" Nottingham do.

The Newcastle-on-Tyne Gas-Works.
" Lurgan do.
" Carmarthen Gas-Works.
" Merthyr Tydfil do.
" Windsor do.
" Leeds do.
" St. Albans do.
" Over Darwen do.
" Rotherham do.
" Aylesbury do.
" Bournemouth do.
" Ystrad do.
" Cardiff do.
" Rochester do.

The Keighley Gas-Works.
" Aberdare do.
" Ballymena do.
" Richmond do.
" Stalybridge do.
" Longton do.
" Exeter do.
" Ross do.
" Falmouth do.
" Barrow-in-Furness do.
" Belfast do.
" Wakefield do.
And other Provincial and Foreign Gas-Works.

IMPORTANT TESTIMONIAL.

The Gaslight and Coke Company (Commonly called the Chartered Gas Company), Beckton, North Woolwich, July 2, 1874.

MESSRS. TANGYE BROTHERS AND HOLMAN.

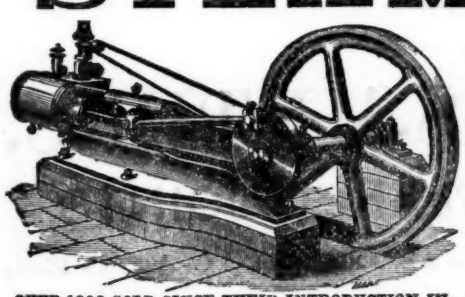
Gentlemen,—In answer to your inquiry respecting the Self-Sealing Lids, I beg to say that they continue to work well, and I have every reason to be satisfied with them.

I should be very sorry to return to the old system of Luting, and our stokers here freely acknowledge the benefit to them of the new system.

I am, yours truly,
(Signed) G. C. TREWBY.

TANGYE'S HORIZONTAL HIGH-PRESSURE EXPANSIVE

STEAM-ENGINES.



OVER 1300 SOLD SINCE THEIR INTRODUCTION IN DECEMBER, 1869.

In designing this Engine the utmost regard has been paid to simplicity of arrangement, strength of construction, and economy in cost. The working parts are considerably reduced in number, as compared with Horizontal Engines generally, rendering it far more durable and compact, the bed-plate, front cylinder cover, guides, and plummer-block for crank-shaft bearing being all cast in one piece, which in design and proportions is admitted by competent engineers to be perfect, and to afford a strength and rigidity that cannot possibly be attained in the best fitted engines of the ordinary horizontal type. The extraordinary stiffness of this Engine will permit of its being driven at a much greater maximum speed than engines generally, and with far less wear and tear. The cylinder with its valve-chest is bolted to the end of the bed. The cross-head slippers and connecting-rod ends are made adjustable, so that any wear can be readily taken up. The fly-wheel, cylinder-end, connecting-rod, and crank-plate, are all bright. All the parts are made to Whitworth's Gauges, and the material and workmanship are of the highest class throughout.

The Governor is of a very special description, and combines in the small space usually occupied by the ordinary steam stop-valve, a governor, throttle-valve, and stop-valve complete. It is exceedingly sensitive, simple, and compact.

These Engines are adopted in Gas-Works at Greenwich (Phœnix Gas Co.), Haggerston (Independent Gas Co.), Nine Elms (London Gas Co.), Falmouth, Harrow, Jersey, Plymouth, Richmond, Rochdale, Santiago (Chili), &c.

NUMBER NOMINAL HORSE POWER	B 2	C 3	D 4	E 6	G 8	H 10	J 12	K 18	M 25
Price of Engine, with Governor	£32	£38 15 0	£46	£70 0 0	£90	£115 0 0	£145	£185	£200
Feed-Pump, extra	3	3 15 0	4	5 10 0	6	7 10 0	8	10	15
Engine and Vertical Boiler on Base-Plate	75	95 0 0	110	150 0 0	180	225 0 0	280	—	—
Engine and Cornish Boiler, with Fittings	—	—	—	—	—	—	—	—	—
Variable Expansion Gear, extra	—	—	10	12 0 0	13	14 0 0	15	16	18

London 1851. New York, 1853. Paris, 1855. London, 1862.

Dublin, 1865.

The SIX MEDALS AWARDED to THOMAS GLOVER for

PATENT DRY GAS-METERS,

The latter being the Highest Medal awarded for Dry Gas-Meters by the Imperial Commissioners for the Universal Exhibition, Paris, 1867.

Paris, 1867.

THOMAS GLOVER & CO.,

DRY GAS-METER MANUFACTURERS,

214 TO 222, ST. JOHN STREET, CLERKENWELL GREEN,

LONDON, E.C.

THOMAS GLOVER & CO.'S PATENT DRY GAS-METERS,

1st, Are a remedy for all the defects of Wet Meters;
2nd, Are suitable for all climates, whether hot or cold;
3rd, Incur no loss of Gas by evaporation;
4th, Cannot become fixed by frost, however severe;
5th, Are the most accurate and unvarying measurers of Gas;
6th, Prevent jumping or unexpected extinction of the Lights;
7th, May be fixed either above or below the level of the Lights;
8th, Cannot be tampered with, without visibly damaging the outer case;
9th, Will last much longer than Wet Meters;
10th, Will not cost more than one-half for repair that Wet or Water Meters do;
Are upheld for five years without charge.

WILLIAM PARKINSON & CO.,

(SUCCESSORS TO SAMUEL CROSLEY,)

COTTAGE LANE, CITY ROAD, LONDON, E.C.

Established 1816.

MANUFACTURERS OF PATENT

WET & DRY GAS-METERS,

STATION-METERS WITH PLANED JOINTS,

GOVERNORS, PRESSURE REGISTERS, GAUGES,

AND EXPERIMENTAL APPARATUS,

STREET-LAMP METERS,

AND REGULATORS FOR AVERAGE METER INDICATION.

METERS FOR MEASURING WATER.

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion, must be authenticated by the name and address of the writer; not necessarily for publication, but as a guarantee of good faith.

THE JOURNAL OF GAS LIGHTING,

WATER SUPPLY, & SANITARY IMPROVEMENT.

TUESDAY, JUNE 1, 1875.

Circular to Gas Companies.

THE select committee on the Metropolitan Gas Companies (Regulations) Bill is now fully constituted. It consists of the Right Hon. W. E. Forster, chairman, and Messrs. Brassey, Bristowe, Talbot, and Goldney. The last-named gentleman sat on the committee of 1866, and therefore comes fully prepared for an inquiry which must, of necessity, cover most of the ground travelled over in the course of the previous inquiries. The political complexion of the members, perhaps, ought not to be noticed; but, under the circumstances, we cannot avoid mentioning that there is a preponderance of members who sit on the Opposition benches. This much, however, must be added—all are men of repute, and essentially business men, to whom the companies may look up with confidence. Their sittings commence to-day. The notice is rather short, but the companies are so well prepared for the struggle, that the limitation of time is of no importance.

We are still in doubt as to whether the proceedings will be long or short. The companies are, of course, in the hands of their legal advisers, and, still more, in the hands of the committee. But it seems to us, as we have said before, the sixth clause, as it now stands, being expunged, there remains very little to discuss. Inasmuch as the companies are perfectly willing to supply 16-candle gas if they are paid for it, and have not the smallest objection to submit to the dictation of referees so far as regards the degree of purity and modes of testing, only one thing remains to be settled, and that is price. Two courses, then, are open to the select committee. They may follow the Acts of 1868–69, and fix a low standard (it cannot be called a maximum) price with the revision clauses; or, which would be the far better course, follow the Act of 1860, and allow the companies a considerable margin of price, trusting to their discretion and honesty to keep the charge as low as possible. In our opinion, the Act of 1860 has worked well for consumers. It might have worked better, but for the negligence of the local authorities. Still, the fact will not be overlooked, that the most rabid opponents of gas companies in general, express themselves perfectly satisfied with the doings of one company as yet under the Act of 1860, whose whole capital is entitled to 10 per cent.

We need hardly repeat what we have said over and over again, that we prefer the principles of the Act of 1860. Writing alike on behalf of companies and consumers, we must express a strong objection to a low standard, and revision clauses. They necessarily entail enormous cost and great worry, which may both be saved. That the companies may be trusted, is clearly shown by the action—or rather inaction—of the Chartered and Imperial Companies this year. Both these companies might, at the beginning of the year, have applied for a revision of price, and as matters stood in January and February, they would have been certain to have obtained something beyond 3s. 9d. They abstained, however, and trusted, we might say, to Providence. As things have turned out, they were right. Contrary to our expectations, and, we may candidly admit, to our vaticinations, the coal market is now in a state very favourable to the companies. We believe the dividends of both are safe, with gas at the standard price; and if things remain as they are, a reduction in the charge may be possible next year. But how are we to be assured of a continuance of low-priced coal? Who, in 1868–69, anticipated a coal famine? The arguments to be drawn from the events which have happened since 1869 are all in favour of the companies. We have had dear coal and low prices for coke, the latter the natural result (in London, at all events) of the economy practised. There are still, we believe, in existence, people who contend that the price of coke always compensates for dear coal. It is a pity that they could not visit, as we did recently, a Corporation works, where we found thousands upon thousands of chaldrons of coke stacked in heaps, towering above the gasholders. "What will you do with it?" we asked. "Why, we shall have to give it away presently," was the reply. And give it away, in a certain sense, they will be compelled to do. In the case of a Corporation, the loss, of course, is of no consequence. But there was in those vast mounds a visible contradiction to the assertion that coke pays for coal. The product was absolutely unsaleable, notwithstanding that the Corporation had paid a high price for the coals.

Admitting, as we have, that the prospects of the current year are good, we may recur to the question, which must be forced upon the attention of the committee—What are the chances of a continuation of the present hopeful condition of affairs? We are all hoping for a general revival of trade, and in time it will come. With it will come increased prices, and fresh disturbances in the labour market. These are the contingencies, or rather certainties, we have to look forward to, and they ought to be sufficient to convince any reasonable man, that a low unalterable price is an impossibility.

The Public Health Bill has passed a committee of the whole House of Commons, and the form of the Bill, as it will go to the Lords, and most probably be passed, is now settled. We may, therefore, take another glance over the provisions which affect gas companies. The 159th section empowers urban authorities to contract with any person for a supply of gas for public purposes. Something has been said about no limit being fixed for the duration of a contract, but we do not regard this as of any importance, since no sensible gas company will, in these times, make a contract for more than a year, or two at the most. The same section will authorize urban authorities to erect works for the supply of gas where there is not any company or person authorized by special Act or Provisional Order. This provision is of some importance. We are not at all afraid of the competition of local authorities with companies, statutory or not, already in possession of the ground, but it will be advisable for a good many to apply next year either for special Acts or for Provisional Orders. In cases where the limits of a gas company are not conterminous with the district of the authority, the Local Board will have power to supply the extra limits. Probably not much difficulty will arise from this provision. We may take it that all the ground that can be profitably occupied is now provided for by a gas undertaking, and that most companies are in a position to avail themselves of all possible extensions. The section will, however, deserve the serious consideration of very many companies, who should lose no time in obtaining parliamentary sanction in one shape or the other. Section 160,

which gives urban authorities general powers to purchase gas undertakings (with the consent of the Local Government Board), need not excite alarm, since it provides that the purchase can only be effected with the consent of three-fifths of the shareholders present, either personally or by proxy, at a meeting specially convened to consider the question of sale. We do not think that many purchases will be effected under the operation of this provision. The larger Corporations, wishful for a gas undertaking, will proceed as before, and the smaller urban authorities will think twice before they saddle themselves with the responsibilities of supplying gas.

We understand that some sort of compromise has been arrived at with regard to Sir W. R. Anstruther's Burghs and Populous Places (Gas Supply) Bill, by virtue of which the opposition will be withdrawn. A clause is to be introduced, protecting the rights of gas companies; and we presume the provisions will assume much the same shape as those of the Public Health Bill just referred to. We must wait, however, for a copy of the amended Bill, before we can express a definite opinion on the points conceded. The second reading has been postponed till the 15th inst., so that petitions against the measure can still be forwarded.

The emphatic contradiction we expected from Maidstone has arrived sooner than we anticipated, and is accompanied by some rather amusing particulars. It seems that the photometer at the offices of the Local Board is the Letheby 60-inch instrument, used, of course, with two candles. The amateur tester of the Corporation had been "instructed" to commence his observations as soon as the candles were lighted, and to take the number on the photometer bar as representing the illuminating power of the gas, weighing the candles being deemed an unnecessary formality. There is no wonder, therefore, that the amateur examiner found the gas under 10 candles. We are only surprised that he did not find it under eight. The fact is that the gas regularly, habitually, and constantly supplied in Maidstone averages close upon 16 candles, and it is a disgraceful thing that a charge should be brought against the company by a gentleman who, however honourable his intentions, has shown himself utterly ignorant of the principles and practice of photometry. A local print informs us that Dr. Letheby has been called in to test the quality of the gas. His report will, of course, be presented to the Town Council, and we shall wait with some curiosity for the explanations which must be made on the occasion.

If there be one thing more disheartening than another to one who ardently desires the political progress of his fellow-countrymen, and who sees in local self-government the best training for the exercise of a wider influence on public affairs, it is to be found at a ratepayers meeting. We say a ratepayers meeting, but the assertion must be qualified; for open doors, with some placards outside, present an irresistible attraction to a large class of idlers who never directly pay rates, and never will. A "rate-"payers" meeting has just been held in Southampton, to condemn and protest against the purchase of the gas undertaking. The proceedings were, however, for the most part carried on in dumb show, the speakers on both sides having to encounter an indiscriminate interruption. In the end, a resolution against the purchase seems to have been carried by a large majority. In the meantime the Purchase Bill has passed the House of Commons without opposition. Whether the resolution of this disorderly meeting can affect its progress through the Lords, remains to be seen.

The meeting of the British Association of Gas Managers at Leeds opens on this day week, and will, we hope, be numerously attended. We do not remember any year in which a more attractive programme has been put forth. All will be glad to learn the results of Mr. Livesey's experience with Hills's liquor process for purifying gas, even if they do not hear it from the experimenter's own lips. We are afraid that the contemporaneous sitting of the committee of the House of Commons will diminish the attendance of the metropolitan members of the association. It is well that Mr. Spice should explain his apparatus for the production and carburation of water gas, for there is a promise that it may some day prove of great value as an auxiliary to coal gas. The difficulty is now, and ever has been, to get the right sort of "spirit;" but this it is very probable will soon be overcome. The papers by Mr. G. Anderson and Mr. Tindall on "Retort "Settings" are sure to command attention. The economy of fuel, and the even heating of retorts, lie at the bottom of success in the manufacture of gas. Mr. Sugg's paper "On a New System of "Railway Lighting," meaning, we presume, lighting railway trains, will have great interest to all who travel. We have recently heard of a new system adopted on the Pennsylvania Railway, of which we hope shortly to give an account. A "Systematic Testing of Consumers Meters" ought to be universally adopted by gas companies, and this, we presume, Mr. Douglas will advocate. "Mechanical Stoking" is a most important subject. The original steam stoker is, figuratively speaking, exploded. Another of the kind may come in its place. To-day Mr. Foulis is master of the situation, and his hydraulic apparatus leaves nothing to be desired. Mr. Warren will, no doubt, do the machines full justice. A word will, we hope, be said for Mr. West's apparatus, so well adapted for medium-sized works, and with a special recommendation on the construction of the scoop, which spreads the charge so evenly over the floor of the retort. We had hoped to hear more of this invention. Perhaps the most important of all the papers to be presented to the meeting is that promised by Mr. Cleland, "On the Economy of Force in Gas-Works in re-"ference to Condensing, Exhausting, and Scrubbing." We shall not anticipate here what the author will have to say, but may remark that, for the future, no one constructing gas-works of any magnitude, can afford to disregard the beautiful invention of Mr. Cleland. An adaptation of the invention to the existing plant of most works, is also easy, and will be certain to be economical. The blessing of getting rid of machinery will be fully appreciated by all gas managers. Mr. Key, probably, has a new station governor; and all improvements are welcome. As we always advocate the supply of public lights by meter, we shall be glad to hear Mr. Bates demonstrate that profits are derivable from this system. The lecture by Mr. A. V. Harcourt, on "Ex-"perimental Inquiries concerning the Purification and Illuminating "Power of Coal Gas," will, we expect, give an account of original experiments, the results of which are always welcome. If the weather prove as favourable as we wish, the excursion (which will, we hope, be graced by the presence of ladies) will bring to a fitting close a meeting that promises to be second to none in the history of the association.

The Metropolitan Board of Works have been exercised on the coal question. A very innocent-minded member proposed a committee of the Board, whose business it should be to see what could be done to reduce the price of coal. It says something for the Board that the majority laughed at the proposal, and agreed to leave the price of coal to be settled by the natural operations of trade.

Next Friday, Mr. Leslie is to move that the Metropolitan Board offer £1000 reward to the discoverer of a process, or processes, for the entire removal of sulphur from gas, either in the distillation of the raw material, or in the subsequent purification of the gas. The reward to be payable subject to the following conditions:—

1. That the successful process, or processes, shall not be patented nor subjected to any existing patent.
2. That it or they shall be in successful operation continuously during three winter months at one or more of the great metropolitan gas-works.
3. That the purifying materials to be used shall be inexpensive, and neither in their action nor in their removal be a nuisance to the population.

What the official auditor would do if the Board should pay the money, we need not inquire. It is only necessary to say here that, if the gas companies be let alone, the removal of sulphur, as far as it is possible and desirable, will be successfully accomplished.

An arbitration to determine the price to be paid for the public lamps at Waterford has just been completed. The arbitrator on behalf of the Corporation was Mr. D. Carrigan, of Tramore, and on behalf of the company, Mr. R. P. Spice, of London. The umpire was Mr. A. G. Vernon Harcourt. It appears that the price hitherto charged has been four guineas per lamp. The Corporation now offered £3 17s. 6d. The arbitrators fixed the price at £4 8s. 8d. We hope to find room for a report of the proceedings next week.

Water and Sanitary Notes.

As regards water supply, the Public Health Bill, which has just passed the House of Commons, simply re-enacts the provisions of the Public Health Act, 1848, and the Local Government Act, 1858. It is not professed that the Bill is much more than a consolidating measure, and in that respect it will be extremely useful; we want a good many more consolidating measures. The Acts named above have never operated to the detriment of a water company, and certainly could not prejudice any existing company able and willing to fulfil their obligations. This part of the Act, therefore, calls for no remark. A new provision which has been inserted in several local Acts is now made general, and will give all local authorities the power to close all private wells, tanks, and cisterns, the water of which is reported to be so polluted as to be injurious to health. There is in this provision a certain amount of arbitrariness, since it places an owner or occupier at the mercy of a fanciful chemist or doctor, with exaggerated notions as to the effect of "sewage contamination," previous or present. The fact is that, under the operation of this law, administered by *doctrinaires*, nearly every private well in the kingdom might be closed; but we do not expect many vexatious applications of the

section. There is, happily, a large amount of common sense abroad, which is an excellent counteractive to the designs of quacks.

An unfortunate accident to the pumping machinery at Arthington has compelled the Corporation of Leeds to curtail the supply of water, and to stop the watering of the streets, which we fear the gas managers will find in a very dusty condition. The necessary repairs, it is said, will take from four to five weeks for completion; but it may be expected that the Corporation will lose no time in duplicating their engines, so as to prevent the possibility of such a failure in the future. They ought before to have profited by the experience of the Hull Corporation, the Brighton Company, and, indeed, many other water undertakings, who have been brought to grief for the want of duplicate engines.

The Leicester Water-Works Bill has passed the committee of the House of Lords, with a proviso that only £30,000 shall be expended within the next eighteen months. The committee refused to allow a clause authorizing the Corporation to participate in the profits on the new capital. The Bill, as it now stands, may be said to leave the Corporation and the company still face to face, and next year will probably witness some further parliamentary proceedings.

The Wakefield Water Company are asking their shareholders for permission to expend money in experimental boring operations. This, we have no doubt, will be readily granted, and we heartily wish the company success. The borings are to be made at Heck, in the county of York, and a strong opinion is expressed that an ample supply of water of first-rate quality will be obtained.

The Blackburn Water Bill, which will transfer the undertaking of the company to the Corporation, has passed the committee of the House of Commons.

Communicated Article.

THE PURIFICATION OF THE SEINE.

(FROM OUR PARIS CORRESPONDENT.)

REPORT OF THE COMMISSION CHARGED WITH PROPOSING THE MEASURES TO BE TAKEN FOR REMEDYING THE POLLUTION OF THE RIVER SEINE AT THE APPROACHES OF PARIS.

(*Concluded from page 752.*)

The examination of the choice of measures to be taken for remedying the pollution of the Seine constituted the most important and most delicate portion of the work of the commission. Under reserve of the more radical processes examined later on, the commission insist upon the absolute necessity of continuing vigorous dredging operations, which grapple with the obstruction of the river at the sewer outlets; and they do this as much from the point of view of public health as from that of navigation. This measure, however, must only be regarded as a temporary palliation of the evil, as it cannot by any right be raised to the dignity of being considered as a solution of the question.

The commission were unable to give consideration to a number of systems emanating from divers persons, the simple enumeration of which will show their inutility:—

1. "Extension of the main sewers as far as the maritime portion of the Seine, or down to the sea." This project would entail enormous expense, while it would simply carry the pollution to some point of the coast.

2. "Extension of the main sewers as far as the confluence of the Oise." The augmentation in the flow of the river, due to the influx of the Oise, would only extend and displace the pollution without destroying its predominant causes—namely, the fermentable matters.

3. "Dilution of the sewage waters, either in the sewers or at their outlets, by the addition of clean water." This would have the same effect as the preceding plan.

4. "Filtration of the sewage water through several substances." This operation invariably gives incomplete results; the argillaceous solid matters, and those held in suspension, pass through the filters, which require to be kept in constant repair, and constitute, with the tanks annexed to them, a serious danger to the public health. The operation is, at the same time, a very costly one, especially when regarded from a working point of view.

5. "Establishment at the sewer outfalls of large settling-tanks, for filtering by the simple action of gravitation." It would be necessary to make these reservoirs of very large dimensions, and, consequently, vast centres of infection would be established. Purification by the settling process would be very imperfect, while the manipulation of the deposits would present serious inconveniences.

6. "Purification by chemical processes, and especially by sulphate of alumina." Upon the proposition of M. Le Chatelier, Inspector-General of Mines, the city of Paris directed prolonged experiments to be made upon sulphate of alumina, which, in regard to sewage waters, appeared to possess practical advantages over lime and the other reagents hitherto known, either in France or in England. The commission witnessed in operation one of the reservoirs constructed with this object in the plain of Genevilliers, and they found the water flowing from it perfectly clear. Already some 600,000 to 700,000 cubic mètres of sewage waters have been thus treated. But the water thus clarified must not be confounded with absolutely pure water. The sulphate of alumina, after undergoing decomposition in the presence of the alkalinity of the sewage waters, and having given alumina in the state of gelatinous clots, simply performs a mechanical clarifying operation; the solid matters are precipitated to the bottoms of the settling-tanks, and the dissolved matters, comprising the fermentable organic matters, remain in the clear water. This will be abundantly shown by the following chemical analysis:—

	Sewage Water in its Natural State.	Sewage Water Purified by Sulphate of Alumina.
Nitrogen	0.037 kilos.	0·021 kilo.
Volatile and combustible matters	0·729 „	0·240 „
Mineral matters	2·038 „	0·724 „
Total	2 804 kilos.	0·985 kilo.

The above analysis confirms the results obtained in England by Dr. Frankland, who found that the chemical reagents removed on the average only 37 per cent. of the organic nitrogen contained in the sewage water. It must be added, however, in favour of sulphate of alumina, that it usually contains an excess of sulphuric acid, and that this acid acts as an antiseptic in retarding the fermentation of the clarified sewage waters; nevertheless, these waters cannot be employed for domestic purposes, as they possess none of the characteristics of potable waters, and their introduction into the river could not be regarded as absolutely innocuous. The process applied on a large scale would necessitate the drying annually of 200,000 cubic mètres of muddy deposits, containing only from 6 to 8 kilogrammes of nitrogen in 1000 kilogrammes of mineral and earthy matters.

The money value of this manure, sold in the neighbourhood of the works, would only be from 6 to 8 francs per ton, while its production would have cost, in reagents alone, from 8 to 10 francs—that is to say, its entire value—without reckoning the expenses of pumping up the sewage waters, the manipulation of the deposits, their transport, &c.—operations which would still further augment the expense in notable proportions.

To purify the 100 million cubic mètres of fæcal and other matters discharged from the sewers, the city of Paris would be obliged to expend on reagents alone, according to experiments made, one centime per cubic mètre, or one million francs per annum, to which there would remain to be added all the other expenses. Such an outlay is absolutely out of proportion to the imperfect result obtained, and the commission were unanimously of opinion that purification by chemical processes could not constitute a general and practical solution of the question.

It is solely in the combined action of the soil and vegetation that, in the opinion of the commission, such solution should be looked for. By means of irrigation, practised upon a permeable soil, sewage waters become not only innocuous, but productive and fertilizing; the requirements of the public health are in every way satisfied, and at the same time cultivation receives a source of manure which up to the present time has been totally lost.

We shall not follow the commission in their exposition of the theory and principle of this system, laboratory experiments having led to the same conclusions as those arrived at by Dr. Frankland when the subject of the pollution of rivers was undergoing inquiry in England; we shall, however, presently examine the processes applied by the city of Paris in realizing practically and upon a grand scale the phenomena established.

In June, 1869, the engineers of the municipal service of the city of Paris commenced the irrigation of the plain of Genevilliers. At Clichy, by the aid of centrifugal pumps worked by engines of 150-horse power, the sewer waters are raised some 36 feet in metal pipes of from 2 feet to 3 feet 6 inches in diameter, and conveyed by the bridge at that place to the plain of Genevilliers, a surface of 143 hectares (353 acres), of which 115 hectares (284 acres) had been treated by sewage water from the 1st of October last. The distribution of the water upon the soil is effected by means of the ridge and furrow plan. Upon the ridges grow the various kinds of plants under cultivation, their roots seeking moisture and manure in the neighbourhood of the trenches, while their green parts remain altogether untouched by the sewer water. In autumn and winter irrigation has been occasionally carried to the extent of a positive inundation, by the partial submersion of the portion of the land to be manured; most frequently, however, the soil not under cultivation is manured equally by means of the trenches and by absorption.

The quantity of water absorbed by the land at Genevilliers has increased since 1869 to more than 18 million cubic mètres, the amount distributed annually per hectare having varied from 50,000 to 100,000 cubic mètres.

The land in the plain of Genevilliers is particularly favourable for the operation undertaken. It is composed of a bed of alluvial soil from 20 to 30 feet thick, consisting of sand and pebbles, covered generally by a thin layer of mould. It is below this permeable mass that are to be found the strata which arrest the infiltrated waters. The plain of Genevilliers, therefore, constitutes an immense natural filter, eminently fitted for absorbing and purifying impure waters.

The commission examined samples of water taken from wells sunk in the centre of the irrigated land, and found it to be perfectly clear, possessing no special flavour, and containing only 1-10th of a gramme of organic nitrogen and 3-10ths of a gramme of total nitrogen per cubic mètre. This water is of greater purity than that of the Seine above the sewer outfalls, and is similar to the water from the springs at Arcueil; its aëration is equally satisfactory, amounting to 3 cubic centimètres per litre.

The commission do not consider that the action of the sewage waters upon the soil at Genevilliers is likely soon to cease through

fouling; the grand phenomena of natural filtration, and especially those of Pays de Caux, favour the belief in a constant permeability, even after mud banks several yards thick have been formed. Now the mean layer of deposits resulting from the practice of irrigation at Genevilliers does not attain a thickness of the thousandth part of a mètre per annum, and the deposits are not thick and foul, but, containing 50 per cent. of silicious matters, are friable and permeable in themselves; by the modes of cultivation adopted they are every year incorporated with the soil, and the result is simply the keeping up or enlargement of the layer of light arable land. This mechanical operation of the absorption of the waters and the incorporation of the deposits with the soil, together with their subsequent utilization by the plants, is at the same time a guarantee against all inconvenience as far as regards the salubrity of the surrounding localities. The water does not remain in any part, and the phenomena of fermentation and oxidation go on in the earth instead of in the sewers. A village named Les Grésillons has recently sprung up around the land occupied by the municipality, and no special disease has shown itself there. The daily growth of this locality, even in the midst of fields where sewer water is in circulation, is the best proof of the innocuousness of the system.

With regard to the agricultural and economic results, the commission testify to the prosperous condition of the irrigated fields. Produce of the most varied kinds is to be found, from vegetables of every sort to flowers and fruit. The fields of cabbages and artichokes especially attracted the attention of the commission on the occasion of their visit in October last. A perfumer grows his peppermint there. The Italian grass presented a thriving appearance, and was then yielding its fourth or fifth crop; the beetroots for the use of cattle yielded at the rate of 100,000 kilogrammes to the hectare.

The rental value of the irrigated land, which was formerly from 90 to 120 francs per hectare, has increased to 500 francs in the domain of the city of Paris.

The commission state that the progressive development of the irrigation works is promoted at present by the free play of private enterprise, without any intervention, by way of coercion or expropriation, on the part of the city authorities.

The commission are strongly impressed with the conviction that the only remedy for the pollution of the Seine by sewer waters consists in the employment of those waters for agricultural and irrigation purposes, and that the system practised upon a permeable soil like that Genevilliers, and applied to the cultivation of kitchen-garden and industrial produce, or to meadow land, adapts itself to prolonged working without risk to the salubrity of the localities irrigated.

The attention of the commission was next directed to the question of how this system might be so developed as to be applicable to the whole of the sewer waters of Paris. They ascertained that there was still a considerable extent of ground available for irrigation purposes in the plain of Genevilliers, and that of the 1300 hectares comprised in that peninsula, about 1000 might be rendered accessible to the sewage waters. These 1000 hectares would require, at the practically recognized quantity of 50,000 cubic mètres per hectare per annum, 50 million cubic mètres of sewage, or about one-half of the total cubical flow from the sewers. The whole of the works requisite for the utilization of this portion of the sewage waters would necessitate an expenditure of 2,615,000 francs (£104,600). For the treatment of the other half the commission have selected a suitable plot of ground of from 1000 to 1200 hectares in extent, situated between Colombes, Nanterre, Rueil, and the Seine. An expenditure of 2,385,000 francs (£95,400) appears to be sufficient for this operation, bringing the total outlay necessary for the purification of the Seine to 5,000,000 francs (£200,000).

According to the opinion of the engineers of the municipal service of the city of Paris, the whole of these works may be easily executed within a period of five years. The works for the utilization of half the sewer waters are to be carried out during the present year, the necessary funds having been voted by the Municipal Council of Paris.

Having again expressed their opinion upon the proceedings calculated to effect the removal of the secondary causes of the contamination of the Seine, arising from the influx of the waters from industrial operations, the flowings from the public urinals, the discharges from dye-works and the various manufactories, as well as the riverain waters not yet carried into the sewers, the commission insist finally and most particularly upon the urgency of the works, in order to arrive at a complete and rational solution of the question of the purification of the river by the combined action of the soil and vegetation.

By this process the substances that have hitherto been detrimental to the public health are transformed into a source of agricultural wealth. Thus the evil not only disappears, but becomes converted into a benefit; public health is protected, agriculture profits, and the grand natural law of restitution is satisfied.

Purification of the Clyde.—On Friday, May 21, Sir John Hawkshaw, Her Majesty's commissioner appointed to inquire into the subjects relating to the purification of the Clyde, and the disposal of the sewage of the city of Glasgow, concluded his inquiry. When the court was opened on the previous Monday, Lord Provost Bain explained that Sir John Hawkshaw had already visited a number of the places the sewage of which was poured into the river Clyde, and he was now anxious to hear any suggestions the citizens might have to offer for his consideration. Evidence was taken during five days, and the number of witnesses examined was upwards of 30. We have received a report of the proceedings, the publication of which is necessarily postponed for want of space.

A TREATISE ON THE SCIENCE AND PRACTICE OF THE MANUFACTURE AND DISTRIBUTION OF COAL GAS.

LXV.

Gasholders.

About the same period that Mr. George Livesey was engaged in the construction of the composite tank already alluded to, concrete was first employed by Mr. Wyatt for a like purpose at the Beckton works. The wall of the tank so constructed was formed by an inner and outer facing of brickwork, and gradually, as these were built, the intervening annular space was filled with concrete. The disadvantages of this system, on economical grounds, were speedily recognized, and the plan already described, and now generally adopted at The Gaslight and Coke Company's works, was introduced, which for the present appears to be the established method of constructing tanks by that company.

The composite tank constructed by Mr. Livesey is 153 feet in diameter and 38 feet deep in the clear. The inner wall or facing is 9 inches thick, but to break the continuous joint of the brickwork and concrete, every seventh course is increased to 14 inches in width, so forming courses of headers which project 4½ inches into the concrete, and effectually bond the one with the other. It appears that the principal object of the engineer in having the 9-inch brickwork, was to overcome the difficulty of fitting a mould to the surface of the tank, which difficulty experience has since overcome. In the erection of this tank, the brickwork or facing was carried up six courses, or 18 inches high, when the concrete was filled in behind to the required thickness, and levelled, it being at the same time supported by a wooden frame until set. A course of 14-inch brickwork was then laid, and on this six other courses of 9-inch work, and again filled in with concrete as before, and so on to the top.

The wall of the tank is 4 feet 3 inches thick at the bottom, diminishing to 2 feet 3 inches at the top, inclusive of bricks and concrete. The tank is puddled over the whole area of the bottom, as well as underneath and outside the wall. The construction is a perfect success, the saving effected by using concrete instead of brickwork being £1700, whilst there is every reason to believe that the former is much superior to brickwork, both as regards strength and durability.

The same method of construction has also been adopted by Mr. J. Douglas, of Portsea, of which he gave a detailed account in a paper read at the last meeting of the British Association of Gas Managers, a communication which must be regarded as of great importance to all interested in the class of construction under consideration, giving as it does the means of determining the quality of Portland cement; the tensile strength of this material when intermixed with sand in various proportions; the progressive increased hardness that each combination acquires during periods of days, months, and years; and the crushing weights of different materials as compared with Portland cement. These and various other matters are treated upon in Mr. Douglas's paper, who also gives a description of the method adopted in constructing concrete tanks, which renders the communication one of great value, and this value is enhanced by the unpretending and modest bearing of the author.

In one point, however, we do not agree with Mr. Douglas, and that is in his assertion that Portland cement, when intermixed with sand, or entering into the formation of concrete, is always porous. In our opinion, the degree of impermeability of a mixture of cement and sand will depend on the freedom of the latter from any foreign matter; for it being conceded that pure cement is not porous, or, at least, is sufficiently impermeable for gasholder-tanks, it follows that, if intermixed with pounded glass, both on account of the cohesive affinity existing between the two substances, as well as their nature, the compound will be as impermeable as the pure cement. If, again, the cement be intermixed with perfectly clean sand (and if granulated all the better), the compound will be found to be equally impermeable. This is not only correct in theory, but is confirmed by experiments made with the view of determining a point upon which much diversity of opinion has existed.

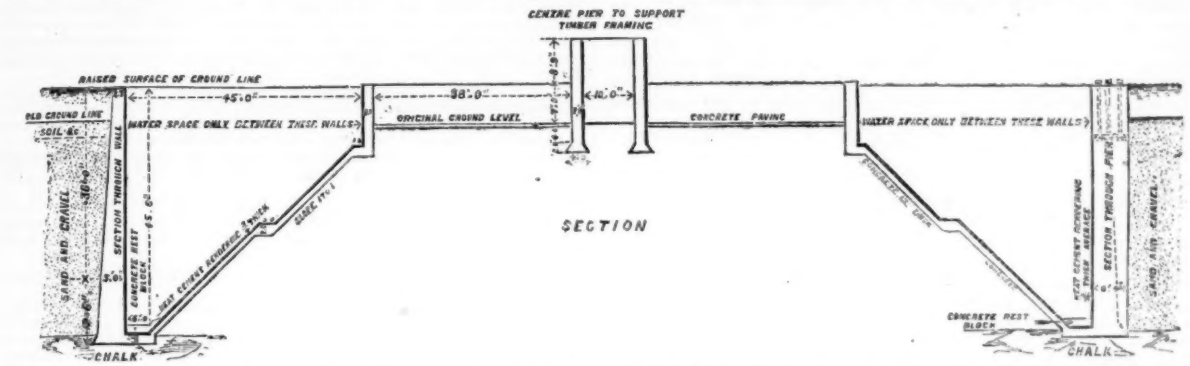
But the presence of loam or clay in any material quantity in combination with ballast, gravel, or sand, will greatly interfere with the impermeability of the compound. In this case each particle of the foreign substance surrounds and attaches itself to the stones and pebbles forming the gravel, &c., so preventing the cement adhering thereto, and subsequently the loam or clay is washed out by the action of the water, when the concrete may be rendered "as porous as a colander." From the experiments referred to, we are firmly convinced that, if due care be observed in the choice of clean sand, ballast, shingle, &c., and the proper admixture of the varied sizes of these materials so as to avoid large interstices, accompanied by a sufficiency of cement, and the employment of ordinary intelligence in the manipulation, concrete will be found quite impermeable for the purpose under consideration.

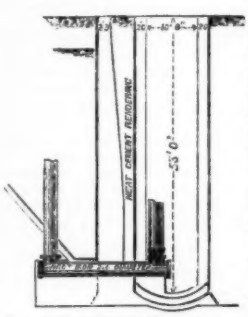
Since the reading of the paper referred to, Mr. Douglas has completed the tank he described, and has put it into active operation, the result of his experience being that concrete, for strength, is far superior to brickwork; that it is decidedly more economical in construction—which, of course, must be governed by circumstances—indeed, on all grounds, it surpasses his most sanguine expectations. Hence, from the success of the various composite tanks described, the great importance of that kind of structure is fully established, and in some localities where gravel abounds the economy to be derived therefrom must be very considerable.

As a further improvement on the composite system, Mr. George

Livesey has constructed a tank, composed entirely of concrete, and, as if determined that nothing but that material should enter into its formation, there is not a single brick or stone, as generally termed, except those existing in the ballast. The whole of the vessel, the coping, and even the rest-stones on which the holder reposes when down, are formed of concrete. He moreover decided on dispensing with puddle entirely, thus making it, so far as our knowledge extends, the first holder-tank constructed in London without resorting to the aid of plastic clay to ensure its soundness. He has likewise abandoned the use of hoop iron for bonding, which he considers useless.

The accompanying engraving represents a half section of the concrete tank, which adjoins the composite tank just described, and will shortly be in action at the works of the South Metropolitan Company. This tank is 184 feet in diameter, and 47 feet deep at the sides in the clear. The site where it is constructed, for a depth of 20 feet, is composed of gravel and sand; beneath this is a bed of fine running sand of about 21 feet, and under this exists a stratum of chalk, in almost a horizontal position, constituting one of the best possible foundations, and on which the walls of the tank are built.




SECTION THROUGH DRY WELL.

On account of the very treacherous nature of the soil, and the immense quantity of water encountered, the excavation was attended with some difficulties. This was accomplished in the manner usually adopted in structures of this kind, of great magnitude; that is, by excavating an annular trench of sufficient width and depth to permit of the outer wall and piers being erected, and afterwards taking out the earth, leaving the cone in the centre, the angle of which is controlled by the angle of repose of the earth. In excavating the trench, the ground was supported by 9-inch deals, placed close together, and supported by struts or walings; and when we consider the great depth, the treacherous nature of the ground, and the weight of the surrounding material, it must be regarded as a skilful operation to execute such a tank without the slightest accident. At a distance of 11 feet from the surface, water was met with in abundance, which naturally augmented as the excavation increased in depth, and, as already stated, the quantity pumped daily for months together was no less than 240,000 cubic feet.

The wall of the tank is 5 feet thick at the bottom—undoubtedly, considerably more than is necessary, but as this was the first work of the kind, and of great magnitude, the engineer preferred to err on the safe side, by making it of ample thickness—it diminishes to 2 feet 3 inches at the top. There are 20 piers in the circumference, in each of which is built six 2½-inch holding-down bolts, to secure the gasholder guide standards, and 40 rest-blocks of concrete support the holder when down. Over the whole of the cone and space surrounding it is placed a layer of concrete, of 18 inches thick, and on the cone is built a circular wall of 90 feet diameter, rendered impermeable by cement, and which rises above the level of the coping of the tank. By this means the water is confined within a very limited space, and its full pressure restricted to a small area; thus the liability to leakage is reduced. The centre circular pier projects 9 feet above the level of the coping, and is intended to support a wooden framing, on which the roof of the holder reposes when down. The holder will be telescopic, and 90 feet high, but the large quantity of metal in the sides, together with the weight of the water-lute, rendered it desirable to dispense with the trussing in the roof, so as to reduce the pressure given by the holder within ordinary limits.

The dry well is also constructed entirely of concrete, cemented underneath, and rendered on the outside for the purpose of preventing the ingress of the water. The inlet and outlet pipes are of wrought iron.

The concrete is formed principally of gravel and sand from the excavation, intermixed with Thames ballast, burnt clay ballast, old retort rubbish, and ordinary clinkers from the accumulation from the furnaces. The proportion of the two last-mentioned materials is undoubtedly small, their principal advantage being their irregular angular form, which appears to facilitate the crystallization and cementation of the compound. From Mr. Livesey's practical experience in the formation of concrete, he finds the best proportions suitable for the purpose are seven parts in bulk of the various materials mentioned, in combination with one part of Portland cement. He is, moreover, of opinion that ten to one would answer the object; but, under the extraordinary circumstances, it was considered advisable, both by the contractors, Messrs. Docwra and Sons, and by himself, to adopt the proportions mentioned.

In this structure Mr. Livesey does not, as already stated, employ a single brick or block of stone, and yet it may be considered a solid cylindrical stone, without either flaw or crack to be seen in the whole of the building, whilst hoop iron and puddle are altogether excluded. In forming the vessel, he relies on the cohesion of the material, of course supported by the earth backing; and, to make it impermeable, the whole of the interior is covered with a rendering of neat cement from one-half to three-quarters of an inch thick, which is the sole dependence for making it water-tight.

As we have already given some detailed specifications, in this instance it will be sufficient to give a brief abstract from that referring to the construction of the tank in question:—

ABSTRACT OF SPECIFICATION FOR A GASHOLDER-TANK TO BE CONSTRUCTED AT THE SOUTH METROPOLITAN GAS-WORKS.

Dimensions.—Diameter, 184 feet; depth, 45 feet 6 inches to top of resting piers. To be a true circle, the sides upright, and the resting piers and the top curb level.

Depth of Excavation.—Chalk is found at about an average depth of 40 feet from the present surface of the ground, and on the solid chalk the foundation is to be laid.

A Dry Well, 53 feet deep, 10 feet diameter, to be built alongside tank, as shown on plan.

Surplus Earth to be placed by contractor on the company's land, where directed, and to properly level the same.

Construction.—To be entirely of Portland cement concrete, the wall of the strength and dimensions shown on drawing, and the bottom also covered with concrete. The whole to be rendered with a coating not less than half an inch thick of neat Portland cement, and the surface worked until it is perfectly smooth.

Materials.—Concrete to consist of the best Portland cement, and perfectly clean, sharp, sandy gravel, mixed dry in the proportions of one of cement to seven of ballast, to be again thoroughly well mixed with an ample quantity of water. It is expected that the ballast to be excavated with that already on the ground, together with a large quantity of clinkers and burnt bricks the company will supply, will be sufficient for the work; but should it be necessary to purchase any Thames ballast, this will be paid for as an extra. The burnt clay ballast on the ground to be mixed with gravel in about equal proportions, and used for concreting the inside of the tank.

Contractor to find everything necessary to carry on the work efficiently and expeditiously, to take means to thoroughly drain the ground, to provide duplicate pumping power, and to be responsible for all damage that may arise to any building or property of any kind in consequence of this work.

Workmanship of every kind to be of the best and most substantial character, and to be executed to the full satisfaction of the company's engineer. The contractor to be responsible for, and to be bound to make good any defects in, work or workmanship; but should the tank be unsound owing to any error in design, or to the principle of construction, for this the contractor will not be held responsible. With this exception, the contractor is to undertake to make the tank perfect and complete, notwithstanding any possible omission or discrepancy in the specification or drawings, and, in the event of any question as to their meaning or intention, the engineer to the company, Mr. George Livesey, shall be sole interpreter, whose decision shall be final and without appeal.

Additions or Alterations not to vitiate the contract, but to be allowed for on either side.

Sump to be filled up when work is done, building a brick well 6 or 7 feet diameter in a convenient part.

Time.—To be completed and ready for the erection of the gasholder by the 1st of May, 1875.

Payment.—To be at the rate of 75 per cent. of the value of the work done. The company having the right to retain a quarter of the whole amount until the tank, so far as the contractor is responsible, is proved to be sound.

The construction of the tank described, on account of the innovations introduced, must be considered a bold undertaking, but it was only determined on after a series of carefully conducted experiments, and we may be assured that, with Mr. Livesey's proverbial caution, he had good and substantial reasons for deviating from the general principles almost universally observed. The stupendous undertaking will speedily be brought into operation, and the only question is to prove it water-tight, which can now hardly be doubted. The saving effected by constructing in the manner described will be just £5000, as compared with the cost of a brick and puddle tank of the same size, and erected on the same ground.

It must be highly satisfactory to the contractors, Messrs. Docwra and Sons, to know that Mr. Livesey awards them their full share of praise for the admirable manner that the work has been carried out. We hope soon to be able to state that the tank is in actual operation, and has proved itself a great success, when the engineer who designed it, and had the temerity to risk his reputation thereon, will be well

entitled to the thanks of all interested in the construction of gas-works.

Another class of tank, which has been constructed in brickwork or masonry, is the annular tank. This, as ordinarily built, consists of two annular walls concentric to each other, and properly puddled, the space between them constituting the tank. This kind of structure is exceedingly expensive, and possesses no advantage over those already described; and it is a remarkable fact that (at least within our knowledge) a second tank of this description does not exist at any works. It may be assumed, therefore, that the experience acquired in the construction of the one has been sufficient to cause the company's engineer to avoid any repetition of the expensive experiment.

(To be continued.)

Correspondence.

RIGHTS OF GAS COMPANIES.

SIR,—In your issue of the 11th inst. a question as to the right of gas companies in bankruptcy or liquidation was asked by "A Collector." As far as I have seen, no reply has been vouchsafed to this letter, and, the question being of paramount interest, I should be glad if any of your correspondents can inform me if the Acts of 1847 and 1871 give power to gas companies to recover in full all amounts due in cases of bankruptcy or liquidation. I have at present cases in point pending upon this matter, and shall greatly esteem any information from those who have had practical experience thereon. The 34 & 35 Vict., c. 41, s. 23 says: "In case *any* person, who shall have been supplied with gas, shall neglect or refuse to pay the amount due in respect to such supply, any justice may issue his summons," &c., &c. Does not this clause clearly mean that ANY consumer, whether he be bankrupt or otherwise, is legally bound to pay his gas account in full, and prior to any ordinary commercial liabilities? If gas accounts be regarded as "rates," it appears to me the power given is unmistakeable; if not, of what protection are the Acts of 1847 and 1871?

A PROVINCIAL MANAGER.

May 23, 1875.

[We hold a very strong opinion that a gas company can, under any circumstances, recover in full, and we should be glad to see the question tried. We recommend our correspondent to take summary proceedings if the debt be under £20. A case reported at page 567 of our present volume shows the opinion of a London magistrate.—ED. J. G. L.]

BUENOS AYRES GAS COMPANY.

SIR,—The notice of the company newly registered as the Buenos Ayres Gas Company, Limited, says: "The object is to acquire the undertaking established at Buenos Ayres, under the name of 'La Sociedad Anonima de Consumidores de Gas,' and to supply Buenos Ayres with gas." Considering that this might convey the idea that there was but one gas company at Buenos Ayres, I stated that there are four at present, and this your correspondent admits.

It is asserted by your correspondent that not one of the three other gas companies at Buenos Ayres is connected with the one there which I represent. This statement I can confirm, the more as I am informed by my principals that they have declined applications made to them with a view to amalgamation with the other three companies.

LOUIS WILDE.

Agent for the (original) Buenos Ayres Gas Company.

4, *Cable Street, Liverpool, May* 26, 1875.

THE AVERAGE METER SYSTEM.

SIR,—In your issue of the 18th inst., I find an article by Mr. E. Ellice Clark, C.E., on this subject, appended to which is a list of replies from different towns (January, 1874).

In this appendix I find it stated that the illuminating power of our gas is 22 sperm candles, and that we *are obliged* to supply it up to that standard.

It is true we supply gas from 20·25 to 22 candles, but our Act of Parliament does not bind us to any particular quality, and we cannot understand how the information has been furnished, unless by the corporation officials.

As the statement is calculated to mislead, I shall feel obliged if you will correct it in your next impression. JAS. DALGLIESH.

Ashton-under-Lyne Gas Company, Oldham Road, May 27, 1875.

BRITISH ASSOCIATION OF GAS MANAGERS.

SIR,—In reply to your correspondent, "Studley Royal," I may say that, with the view of evincing their interest in the coming meeting, and a desire to exhibit that hospitality for which Yorkshire is so famous, a committee of gentlemen has been formed, who will, in the course of a day or two, issue an invitation to each of the members to take part in the excursion named in the programme published by me. At the time this programme was sent out, the arrangements had not been sufficiently settled to allow of my stating more than that such an excursion was contemplated. "Studley Royal" will, therefore, see that, as the members are to be entertained by their Yorkshire friends, it was not within my province to do more than I did. One cannot play the part of host and guest too. I have, however, to-day received an intimation that ladies will be invited, and to none will the announcement be received with greater pleasure than to

42, *Parliament Street, Westminster,* W. H. BENNETT, Secretary.

May 29, 1875.

SIR,—In reply to "Studley Royal," in your last issue, I have to inform him and the members of the association that, from circumstances beyond the control of the committee, the delivery of the invitation circulars to members has been unavoidably delayed, but they will be in their hands, in all probability, per same post as your issue of June 1, and, with all deference to your correspondent, it is probable that even the ladies will enjoy the excursion with greater zest from having been kept on the tiptoe of expectation.

JAMES JOWETT,

Hon. Sec. of Reception Committee,

Leeds, May 29, 1875. Brit. Assoc. Gas Man.

Parliamentary Intelligence.

HOUSE OF LORDS.

FRIDAY, MAY 28, 1875.

The following bills received the Royal Assent:—Eastbourne Water, Maidenhead Water, and Carmarthen Gas.

The LORD CHANCELLOR acquainted the House that the further Standing Orders applicable to the Worksop Water and Stroud Water Bills have been complied with; and that no further Standing Orders are applicable to the Birmingham (Corporation) Water, Newport (Monmouthshire) Gas, and Worthing Gas Bills.

The following bills, brought from the Commons, were read the first time and referred to the examiners:—Birmingham Gas (No. 2), Broadstairs Water (Nos. 1 and 2), Busby Water, Hamilton Water, Marlborough Gas, Southampton Corporation Gas (Purchase, &c.), Tunbridge Wells Gas, Widnes Local Board.

The CHAIRMAN of COMMITTEES informed the House that the promoters do not intend to proceed further with the Birmingham Gas (No. 1) Bill during the present session.

The CHAIRMAN of COMMITTEES gave notice of his intention to move, on Thursday, June 3, that, in the event of the Standing Orders being dispensed with in respect of the petition for additional provision in the South Staffordshire Water Bill, the bill be recommitted.

A petition against the Gas and Water Orders Confirmation Bill was presented from the North-Eastern Railway Company.

Petitions against the following bills were presented:—Birmingham and Staffordshire Gas, from (1) Corporation of Birmingham, (2) West Bromwich Improvement Commissioners, (3) Manor of Aston and Handsworth Local Boards, (4) Birmingham Gaslight and Coke Company; Birmingham (Corporation) Gas, from (1) London and North-Western and Great Western Railway Companies, (2) West Bromwich Improvement Commissioners, (3) Manor of Aston and Handsworth Local Boards, (4) Birmingham and Staffordshire Gaslight Company, (5) Birmingham Gaslight and Coke Company, (6) Local Boards of Health of Smethwick, Oldbury, and Tipton District; Birmingham (Corporation) Water, from (1) London and North-Western and Great Western Railway Companies, (2) Birmingham Water-Works Company; Manchester Corporation Water and Improvement, from (1) Thomas, George, and Robert Clay, (2) S. Mellor and J. Brooke; Newport (Monmouthshire) Gas, from (1) The Lord Tredegar, (2) Alexandra (Newport) Dock Company; Oldham Corporation Water, from (1) James Seville, (2) A. K. Sidebottom, Messrs. Butterworth and others, (3) Owners, &c., of mills and other works on the river Tame; Waterford Improvement, from (1) City of Waterford Gas Company, by Messrs. Sherwood and Co., their agents, (2) Burgesses, gas consumers, &c., of Waterford; Worthing Gas, from Worthing District Local Board of Health and West Worthing Improvement Commissioners.

HOUSE OF COMMONS.

MONDAY, MAY 24, 1875.

The Birmingham Gas (Nos. 1 and 2), Broadstairs Water (Nos. 1 and 2) Marlborough Gas, and Tunbridge Wells Gas Bills, were read the third time, and passed.

The Southampton Corporation Gas (Purchase, &c.) Bill, as amended, was considered; to be read the third time.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY (No. 2) BILL.—Petitions against this bill were presented from gas companies situated at Peterhead, Airdrie, Larkhall, Forres, Wishaw, Stewarton, Stirling, Kirkcaldy, Langholm, Ayr, and Edinburgh. Petitions in favour were presented from burghs of Renfrew, Wishaw, Berwick, and Stewarton.

Mr. COWAN gave notice, on the second reading of the bill, to move—"That it be read a second time upon this day three months."

METROPOLIS GAS COMPANIES BILL.—A petition against this bill was presented from the Ratcliff Gaslight and Coke Company, and referred to the select committee.

On the motion of Sir CHARLES ADDERLEY, Mr. William Edward Forster, Mr. John G. Talbot, and Mr. Bristowe were nominated members of the select committee; and it was ordered that all petitions against the bills presented on or before the 31st day of May be referred to the committee, and all petitioners be heard by themselves, their counsel or agents, upon their petitions, if they think fit, and counsel heard in favour of the bills against the said petitions. Three to be the quorum.

METROPOLIS WATER SUPPLY AND FIRE PREVENTION BILL.—The second reading of this bill was deferred till Friday, June 4.

TUESDAY, MAY 25.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY (No. 2) BILL.—Petitions against this bill were presented from Edinburgh, Tillicoultry, Lockerbie, Elland-cum-Greetland, Haslingden, Musselburgh, New Cumnock, Montrose, Worcester, Alloa, Richmond Gas Company, and Croydon Commercial Gas and Coke Company. Petitions in favour were presented from Musselburgh and Hawick.

The second reading of the bill was deferred till Tuesday, June 15.

METROPOLIS GAS COMPANIES BILL.—The Committee of Selection have added Mr. Goldney (Chippenham) and Mr. Thomas Brassey (Hastings) to the committee on the bill.

THURSDAY, MAY 27.

The Southampton Corporation Gas (Purchase, &c.) Bill was read the third time, and passed.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY (No. 2) BILL.—Petitions against this bill were presented from Stourbridge, Cheltenham, Dover, Derby, Coldstream, Sheffield, Falmouth, Charlton, South Shields, Durham, Battle, Bristol, and Cumnock. A petition in favour was presented from Cupar.

METROPOLIS GAS COMPANIES BILL.—A petition against this bill was presented from the Crystal Palace District Gas Company, and referred to the select committee.

FRIDAY, MAY 28.

BURGHS AND POPULOUS PLACES (SCOTLAND) GAS SUPPLY (No. 2) BILL.—Petitions against this bill were presented from Dalkeith and Stonehouse. A petition in favour was presented from Peebles Gaslight Company.

METROPOLIS GAS COMPANIES BILL.—Petitions against this bill were presented from the following companies:—Surrey Consumers Gas, The Gaslight and Coke, Independent Gaslight and Coke, South Metropolitan Gaslight and Coke, Phœnix Gaslight and Coke, Imperial Gaslight and Coke, and referred to the select committee.

The Blackburn Water Bill was reported.

METROPOLIS GAS COMPANIES BILL.—The select committee appointed by the House of Commons to consider the Metropolis Gas Companies Bill met on Thursday last, and selected the Right Hon. W. E. Forster as chairman. The other members of the committee are Mr. Bristowe, Mr. J. G. Talbot, Mr. Brassey, and Mr. Goldney. The committee fixed Tuesday, June 1, for commencing the inquiry.

HOUSE OF LORDS COMMITTEES.

TUESDAY, MAY 4.

(*Before the* EARL OF MORLEY, *Chairman; Earl* FORTESCUE, *Lord* DUNSANY, *Lord* ASHBURTON, *and Lord* HANMER.)

LEICESTER WATER BILL.

Mr. POPE, Q.C., and Mr. LEDYARD appeared for the promoters; Sir E. BECKETT, Q.C., for the corporation, petitioners against the bill.

Mr. POPE opened the case, and said this was a bill to enable the Leicester Water-Works Company to raise additional capital, but not for the purpose of constructing new works. It was, he believed, admitted on all hands that the supply of water to Leicester was amply sufficient; all that was wanted now being additional means of distribution. They had two reservoirs at Bradgate Park and Thornton, and it was now proposed to raise £100,000 by the issue of new shares. The only opposition to the bill came from the corporation, who in 1851 guaranteed the company such a sum as enabled them to raise a large sum of money, the corporation making a very handsome thing of the arrangements they then made. In 1866 another agreement was made with the company, the result of which was that the corporation had since then made from £30,000 to £40,000 out of the company. Now they came to Parliament to ask for more capital, the corporation came forward and said, "We drove a good bargain when you were in needy circumstances; we have made a handsome profit out of it; and we now come forward to say that you have no right to raise additional capital unless you put us on the same favourable footing we have stood on, and pay us at an exorbitant rate." By the present bill it was intended to limit the dividend to 7 per cent. on the new shares, and by the operation of the general Act, as their lordships knew, all profit would be devoted to lessening the price of water. The corporation also opposed the bill on the ground that the raising of additional capital would stand in the way of their purchasing the company, and that next session they intended to come to Parliament for a bill. Under a former Act they had power to purchase the Thornton branch of the works; but, since this bill had passed the House of Commons, a set of bogus resolutions had been passed, to the effect that the corporation intended purchasing the whole of the undertaking as it stood. They were only passed in March, and he (Mr. Pope) had no reason to suppose that it really was with the consent of the ratepayers that any such resolutions were passed. The corporation really said, "If you don't let us share in your surplus capital, why we will try and buy you out before you get too big."

Mr. *E. S. Ellis*, chairman of the company, examined by Mr. LEDYARD, repeated the evidence given by him before the committee of the House of Commons with regard to the arrangements entered into with the corporation in 1851 and 1866, and said the promoters had borrowed no money of the corporation since 1858, but they had paid them since then £19,118 16s. 4d., or £11,363 more than the promoters had received from the corporation. The corporation held 1700 shares, which represented a capital of £42,500. The whole of the share capital raised under the two Acts had been expended, and besides they had had to spend £4000 more, for which he considered himself responsible. The shares were now at a premium of £9, and he had no doubt that all new shares would be taken up at once and sold at a premium. He knew that the corporation would be glad enough to get as many shares as they could. The corporation had made a very good bargain in 1851 and 1866. It was absolutely necessary that the company should have additional powers granted to them to raise capital, because they were receiving constant applications to lay down mains in new streets. There had been several new trades lately introduced into Leicester, and a constantly increasing demand for water. For certain sanitary purposes the corporation got six million gallons gratuitously, but in addition they got as much more as they wanted for 2½d. per 1000 gallons. As chairman of the company, he had been advised by the engineer that £100,000 more capital was required. With regard to the purchase of the works by the corporation, he never heard anything of the kind suggested in 1866, and had it been, all the directors would certainly have opposed it. Neither did he think it would be fair for them to step in now and attempt to purchase the works. He thought also that it would be better for the corporation itself if they left the management of the water-works in the hands in which they now were, rather than spend a large sum of money in purchasing them. They would, of course, still continue to participate in the profits as heretofore. He spoke more as a ratepayer than as a shareholder, for his interest in Leicester was greater than his interest in the water-works company.

Cross-examined by Sir E. BECKETT: The corporation borrowed money at 4 or 4½ per cent. He did not know that it would have been a good purchase for the corporation to have taken the works in 1851. All that it would have done would have been to raise the rate of shares to £35.

Mr. *Hawksley*, the company's engineer, was examined by Mr. BIDDER, and said the requirements of the town of Leicester would make it necessary to expend the new capital authorized by the bill within the proposed period of 22 years. Not all, however, would be wanted for purposes of distribution; the company might want fresh reservoirs as population increased, and at Bradgate additional engine power before their present reservoir was fully worked. Then they would want money for meters and for house service-pipes; for, contrary to the usual practice, the company gave the inhabitants of Leicester service-pipes without remuneration. In his opinion a company should have power to raise capital sufficient for 20 or 25 years, to avoid a too frequent application to Parliament.

WEDNESDAY, MAY 5.

Mr. *Hawksley* was further examined this morning.

Sir E. BECKETT said he did not propose to ask the committee to insert a clause giving the corporation power to purchase the works, but only to guard their interest by seeing that nothing should be done to their prejudice if they should next year seek power to purchase.

In answer to the CHAIRMAN, witness stated that he thought that if the £100,000 new capital were allowed, £30,000 would be spent in the next 18 months.

In cross-examination, witness said that he had exchanged views upon the bill of 1866 with the late town-clerk, but had never acted as negotiator. The town-clerk knew what was in the bill and what was not.

Mr. *Haxby*, the solicitor to the company, was called, and, in reply to Sir EDMUND BECKETT, said he had been led accidentally to the discovery that powers of purchase were not extended to the new works in the Act of 1866. His attention had not been drawn to the point.

Mr. BIDDER stated that, with a view of guarding against any excessive immediate expenditure, he was prepared, on the part of the promoters, to insert a provision at the end of clause 4, after the provision relating to the raising of £100,000, to the following effect:—"Provided always that the company shall not create and issue shares for more than the sum of £50,000 within 18 months from the passing of the Act, and that they shall not thereafter create or issue further shares unless and until the whole of the said sum of £50,000 shall have been called up and expended for the purposes of the company's undertaking."

Sir E. BECKETT said that £50,000 would not satisfy him. It was much too large a sum. He did not oppose the preamble, however, and the better course would be to go into the clauses at once.

The consideration of the preamble was accordingly postponed.

After some discussion on clause 4, a proviso was agreed to be added in the terms proposed by Mr. Bidder, but with the substitution of £30,000 for £50,000.

Sir E. BECKETT then addressed the committee in reference to participation in the profits by the corporation, contending that they had the same right to participate in future surplus profits as they had enjoyed in past profits, and that the non-exercise of purchasing powers by the corporation was a *quid pro quo*.

Mr. BIDDER characterized the claim of the corporation as a cool proposition, and urged that there was no stipulation that the corporation should not exercise their purchasing powers.

The COMMITTEE decided that it was inexpedient to allow a clause authorizing a participation in the profits, and the remaining clauses were then gone through and settled, and the preamble having passed, the chairman was ordered to report the bill, as amended, to the House.

TUESDAY, MAY 4.

(*Before Lord* WINMARLEIGH, *Chairman; Earl* AMHERST, *Viscount* POWERSCOURT, *Lord* WOLVERTON, *and Lord* LISGAR.)

TRURO WATER BILL.

Mr. LITTLER, Q.C., and Mr. STEPHENS appeared for the promoters; Mr. POPE, Q.C., and Mr. MICHAEL for the Corporation of Truro, petitioners against the bill.

Mr. LITTLER stated the case for the promoters, and said he should take the opinion of the committee on the question whether the corporation, having withdrawn their petition in the House of Commons, had now a right to be heard in their lordships' House.

Mr. POPE having been heard in reply,

The room was cleared, and, on the readmission of the parties, the CHAIRMAN said the committee were of opinion that the petitioners had a *locus standi* in this House.

Capt. *J. Thomas*, examined by Mr. LITTLER.

I am the manager of the Dolcoath, West Frances, and other mines. Dolcoath is the most extensive mine in Cornwall. I am thoroughly acquainted with Cornish mining. I have examined the water-works near Truro which have been erected by the Truro Town Council. There is a shaft which had been sunk 50 feet when I visited it. There is a level driven about 10 fathoms north or about 7 fathoms north-west from the bottom shaft. There is very little water in the north level. In the north end there is scarcely any water at all. The nature of the ground there is hard rock, or what we call clay-slate, one of the hardest rocks you can meet with. There is a little more water in the south-west end. There is not much chance of getting an increase of water there at all by continuing the level further on. There are no signs of fissures at the north end. The other end is softer, but it is the same kind of rock; it is more shaley in one end. The well is not more than 50 or 60 feet from the river. The only way of getting the water would be to drive into the river.

Cross-examined by Mr. POPE: I am a mining engineer, or a mining manager. I direct all the underground works in the mine. I have never constructed works for obtaining water. I have sunk shafts and driven levels extensively. There is no certainty that, if you penetrate the hard schist rock for a few feet, you may come upon water at any moment, unless you meet with a mineral vein or cross lode. I cannot tell whether you would do so here or not.

Mr. POPE: But you might go on for a few feet and reach floods of water?

Witness: Yes, if you cut a mineral vein or a cross lode. But, if you cut a mineral vein or a cross lode, then you would not have pure water; there would probably be some lead or copper in it.

Re-examined by Mr. LITTLER: Drinking water is not found in cross-cuts. I should not advise it as a source of supply. It is always poisonous, as far as my observation goes.

Mr. *Orchard*, examined by Mr. STEPHENS.

I am a timber merchant and town councillor in Truro. I have had practical experience in mining. I have had great experience in water-works, and was connected in California with a scheme to bring water over 60 miles. I have taken a great interest in water-works since my return to this country, and petitioned against one of the streams to be used in the Truro scheme. Last year I opposed the bill, on the ground that the matter should be with the corporation; but since then I have changed my mind, seeing that the corporation take but little interest in the matter. I say that as a member of the corporation myself. The corporation works were begun since April last. They propose to pump water from Bosvigo Bridge into the town. The present yield of this well is about five or six gallons a minute. That is not a suitable supply for the population of Truro, and the supply has decreased within the last few months. They cannot get good water within the borough. I have watched the supply at the corporation works, and have frequently measured it, and the supply is decreasing. In order to get an increased supply, they have asked the tin-smelting company if they have more water than they require, if so the corporation would turn it into a reservoir at their well. But in the dry season the smelting company have scarcely sufficient water for themselves. The water in some cases is very bad; I know myself of white mundic being in the water, and have heard of lead and copper. I should not like water in which there was any kind of mundic. I believe it is extremely dangerous. I have spoken to hundreds in Truro, and also to several engineers, and the general opinion is as I express it. After the resolution of the 8th of January a requisition was got up in favour of opposing the present bill, and although supposed to emanate from the ratepayers and owners in the borough, in reality it came from the corporation. The requisition was signed on the 28th of January, and the petition was sent in on the 19th of February. The meeting of ratepayers was held on the 8th of March. I was present. I remember the resolution being carried. The meeting was convened to support the action of the corporation. The bill was to be on in the House of Commons on the 11th of March, when it passed through as an unopposed bill. The bill was read in their lordships House on the 1st of April. A poll was taken at a meeting on the 19th of April, when there was a majority against the corporation of 39 votes. A protest was made, however, against the legality of the meeting. The corporation at the present time have no settled scheme to supply Truro with water. They have only the well.

Cross-examined by Mr. POPE: I know that 25 guineas has been spent by the corporation in water analyses, but where the water came from which was examined I do not know. I cannot say that the water which the promoters of this bill intend to supply is good. I consider that the corporation are the proper body to supply water to the town if they could carry the matter out properly, but I do not think they are able to do it.

By the CHAIRMAN: I believe that the stream from which the present company intend to supply the town would give sufficient water with adequate storeage.

Mr. *Hugh Owen*, examined by Mr. LITTLER: I am an officer of the Local Government Board. [Witness handed in letters from the board to the Corporation of Truro, which went to prove that there were no plans of the corporation ready up to the close of last year. Repeated applications were made by the Local Government Board for plans of the proposed water-works, but they were put off from time to time. The letters went to prove that the plans were never deposited.]

Cross-examined: The Local Government Board never received any plans from the Truro Corporation. I believe that if the engineer of the board, Mr. Rawlinson, had received the plans, he would have sent them in at once to the proper office. Mr. Rawlinson never received plans of proposed works in the first instance.

By the CHAIRMAN: Until I came into the room I had no idea that it would be asserted that the plans were ever deposited with the board. I only received notice this morning. Mr. Rawlinson has not been communicated with to my knowledge.

Mr. *W. Shelford*, examined by Mr. STEPHENS.

I am a civil engineer. My first connexion with the Truro Water-Works commenced in 1870. I was in favour of the scheme of 1869, and was supported by many eminent engineers. The great objection to the scheme of 1869 was the cost; the present one is a modification, but would be a much cheaper one, and had none of the objectionable features of the former. The present scheme is the only feasible one. I submitted the water of the stream for analysis to Professor Miller, and it was reported to be exceedingly good. I also submitted the water of the proposed stream to be sent for analysis to several eminent chemists. My observation of the quantity of the water is that there is quite sufficient for the supply of the town. Correctly speaking, there are only two sources of supply, though the opponents of the bill say there are four. It is impossible to estimate the quantity of water to be got out of the corporation well. I should think, however, that it could only supply 1-30th of the quantity required by Truro. In my opinion, if their lordships sanction this scheme, Truro will have a sufficient supply of water. I am also of opinion there would be no difficulty in raising the remainder of the capital. Witness was asked by Mr. Michael to produce the list of subscribers to the scheme; but Mr. Stephens, on behalf of the promoters, declined to put it in.

Cross-examined by Mr. MICHAEL: I propose to employ a 15-horse power engine. I consider one will be quite sufficient. If it breaks down we shall resort to water power while it is being repaired. We shall have two days supply in hand.

Re-examined by Mr. STEPHENS: The white mundic is a very dangerous substance; some kinds contain a large quantity of arsenic. I think that water impregnated with this substance would be a very improper water for drinking purposes. I am certain that our works can be constructed within the proposed limits of capital. I believe if this bill were rejected the corporation would come to Parliament for the same powers. As far as I am concerned I should not be in favour of the corporation having power to carry out this bill, but if the committee give powers of purchase to the corporation, of course they should carry it out.

By the CHAIRMAN: My calculation is for 20 gallons of water per head per diem. That would not consume the maximum supply of water. I think 20 gallons a head is quite sufficient. Our mains go into every street in the town.

Mr. *Henderson*, examined by Mr. STEPHENS.

I am an associate of the Institution of Civil Engineers, and captain of the Truro Volunteer Fire Brigade. I canvassed the town with Mr. Cock in support of the scheme of 1869. The scheme was too expensive, and so fell through. By having the works at the place now proposed, we shall have the advantage of a large supply at a small cost. The present scheme was under consideration in Truro since 1873. If these works are allowed by Parliament, they will be carried out by me, conjointly with Mr. Shelford. We are responsible for the proper carrying out of the scheme. The corporation well is about 60 feet in depth. I do not know what the corporation mean to do with it. I have seen no plans. There is a gallery in the well leading to the river, and I believe that the corporation are determined to get water at any cost. I have heard no other reason given for the existence of a shaft. It would be a ridiculous scheme if the corporation got the water from the river into the well, and then pumped it again into the town. Local feeling has been greatly against the corporation scheme.

Mr. *Hassard*, examined by Mr. STEPHENS.

I am an engineer, and have great experience in mining, having been engaged in works at Dublin and other large towns. A very good supply of water can be got by this scheme. I have examined the Coosebean valley; the water was quite red, and impregnated with sulphate of iron. I consider that such water would be very bad for the supply of a town. From my experience I can say that the corporation could never get a proper supply of water from their well. We could get a plenty of storeage, if required, and could meet the wants of any increase of population.

Cross-examined by Mr. MICHAEL: I believe that the gauging has been underestimated. Part of the scheme last year was to sink a well.

Mr. *Dugald Campbell*, examined by Mr. POPE.

I am a professor of chemistry. I have analyzed the water sent to me from Mr. Shelford, taken from the main stream, and also from above the weir. The water was good—pure to the taste, and almost colourless. Had boiled it to test its hardness.

The CHAIRMAN: Unless the opposition dispute the analysis, there is no use in going on with this evidence.

Mr. POPE: We do not dispute the analysis, but we may dispute where the water was taken from.

Examination continued: I also received some water sent to me from the corporation well. It did not compare favourably with the other samples; there was a large per centage of organic matter in it. I did not analyze this water myself. There is little difference in the two waters as far as drinking purposes are concerned, but the water proposed to be supplied by this bill is the better of the two.

Two local witnesses were then called, who spoke to the strong feeling which existed in the town against the corporation scheme.

This would have closed the case for the promoters, but Mr. POPE pointed out that there had been no evidence given as to the share capital of the company.

Mr. LITTLER said that from the feeling in Truro there would be no difficulty about getting the money when the bill was passed.

The CHAIRMAN said he considered that there should be some proof on the point.

Mr. *Dickinson* was called, and proved that upwards of £9400 had been promised, and that there would be no difficulty in raising all the capital required if the bill passed.

WEDNESDAY, MAY 5.

Mr. POPE, in addressing the committee in support of the opposition, submitted that it would not be right for Parliament to take away from the sanitary authority the power to supply water to their district, if they were willing to do so. There could be no doubt that the sanitary authority alone should have the power of supplying water to a town. If this bill were passed the poorer classes of Truro would be as badly off for water as if no supply existed, because the company would have no power to compel people to take their water, whereas the sanitary authority could.

Mr. *Cock*, examined by Mr. MICHAEL.

I am town-clerk of Truro. The question of water supply has been mooted from time to time in the council. In 1869 a bill was obtained by outsiders to supply water to the town. I supported that bill, but the capital required being so large, we found it impossible to raise it, though several of the large landed proprietors took provisional directorships, provided so much capital was subscribed; but, as it was found impossible to get the amount required, the matter fell through. The reports of the sanitary authority were either accepted or rejected by the council. There were two meetings of the council per month, when reports of committees were either accepted or rejected. I do not pretend to be a geologist, but I believe that the ground is the same where Mr. Shelford would sink his well as it is at the corporation well. At the close of last year I first saw the advertisement of the present bill. The usual steps were at once taken to oppose the bill. A letter was received from the solicitors of the promoters detailing the scheme for the water supply. The letter and proposals were rejected at once by the council. I was instructed to take steps to oppose it at once. The notice of a meeting of the council at which resolutions were to be proposed respecting the scheme of the company was advertised, and it was held on the 8th of January.

Cross-examined by Mr. LITTLER: If this bill is thrown out, I do not know whether the corporation intend to go on with their scheme, or to submit their propositions to the ratepayers. To some extent the objection of the corporation to the present scheme is that the supply of water will be in the hands of a company. The opposition to the bill of last year cost the ratepayers £400, and I suppose the present opposition will cost about the same.

Mr. *Solomon*, examined by Mr. MICHAEL.

I am a magistrate in Truro. Under the Act of 1872 the urban sanitary authority first had power to get a water supply. I consider it of the utmost importance for the council to have the supply of water in their hands. The general feeling of the town is with the council. I do not believe that a private company could properly supply the town with water. We (the council) are working under the direction of Mr. Birch. I cannot say whether we have plans or not.

Cross-examined by Mr. LITTLER: If this company should obtain their bill, and find it did not pay them to carry on the works, I do not think the corporation would ever be inclined to buy them up at a reasonable price.

Mr. *Birch*, examined by Mr. MICHAEL.

I am a civil engineer, and a member of the Institute of Civil Engineers. I have been engaged on engineering works throughout all parts of the country. On instructions from the Truro Corporation, I visited that town and spent over a week in examining every available spot of ground for water. I was not confined to the borough. I selected a well in the basin of Truro. It is now known as the corporation well. We shall have two mains, and in case of accident we shall be able either to supply the town from the reservoir or from the spring. We shall allow 25 gallons per head per day. [The plans of the proposed works were produced.]

Mr. *Greenhill*, examined by Mr. MICHAEL.

I am an engineer, and have had some practical experience of water-works. My estimate for the corporation works was £13,900.

Cross-examined by Mr. LITTLER: I do not guarantee the quality of the corporation water.

Mr. LITTLER then addressed the committee on behalf of the promoters. He said that during his whole experience, both in their lordships House and the House of Commons, he had never met with a line of conduct like that adopted by the Corporation of Truro. They had heard of plans of the proposed corporation water-works being in existence, but it was conclusively proved that no such plans ever existed. It had been stated that plans were deposited with the Local Government Board, but from the letters which had been handed in, it was conclusively proved that the corporation had put off the board from time to time, and in the end never sent in any plans at all. The promoters had great reason to complain of the conduct of the corporation. When the bill was before Parliament last year, it was said by their opponents that the corporation was only a newly elected body, and that if time were allowed them they meant to carry out their own water-works scheme. But what had been done since? They made borings for a well, and the people of Truro had just as little chance of getting a supply of pure water as ever they had. He ventured to say that, if this bill were rejected, the corporation would never be able to supply Truro with a sufficient quantity of water until they were compelled by an order from the Local Government Board, when he believed they would endeavour to get leave to abandon their present works and go to those adopted in the present bill. He held that the Corporation of Truro had adopted such a line of conduct as put them outside the pale of being heard at all in the matter. Only on the previous day a very fair offer had been made by his clients. They had offered to lay the matter before Mr. Bateman, and accept his decision as to whether the corporation could supply pure and sufficient water to Truro or not, and in the event of Mr. Bateman's decision being against the corporation, they (the promoters) asked to be let alone. They had proposed Mr. Bateman because he was considered an eminent authority upon these matters, but they were willing to submit the matter to any other eminent engineer. The corporation, however, had refused that fair and reasonable proposition. Mr. Cock, the town-clerk, could give no definite answer as to what the corporation intended to do, about carrying out their scheme, if this bill was lost; he could not say whether they intended to go on with their works, whether they would abandon them, or whether they would make the taking of water compulsory. The corporation created great prejudice against the promoters last year by saying that they did not intend to take compulsory powers, but this year they came before the House and said, "We can take compulsory powers." That was, however, all nonsense; the sanitary authority could compel people to take water from the private company. It was not necessary that the sanitary authority should have control of the water-works. The corporation had no evidence that the water from the company's site was bad. They brought forward an engineer—an eminent man, no doubt—who had sunk wells in other parts of the country where the beds were chalk, but who had no experience of sinking-wells in ground so peculiar as that where the corporation well was sunk. Even he could not say whether they would get a sufficient quantity of water by further sinking, nor would the contractor undertake the risk. If the company could not carry on the works with profit, then it would be time for the corporation to step in and buy them. Why should Truro wait any longer for the corporation? They had waited since 1848, and had done nothing. It was just the story of the dog in the manger—they would not make the works themselves, nor would they allow any one to do so. The speech of Mr. Pope had been chiefly confined to the contention that the power of supplying water should not be taken from the sanitary authority. He (Mr. Littler) did not admit that the sanitary authority should have the power in all cases, and in this case he would say that the sanitary authority had forfeited all confidence on the part of the inhabitants of Truro. In conclusion, he contended that the petition was a groundless one, and ought not to be received.

The committee-room was then cleared, and, on the parties being readmitted,

The CHAIRMAN said the committee considered the preamble of the bill was proved, but they were of opinion that some power of control should be given to the corporation over the supply of water. Holding that view, they suggested that the parties should confer together, and see if a clause could be inserted in the bill, giving such power.

THURSDAY, MAY 6.

Mr. LITTLER proposed the insertion of a clause in the bill to meet the recommendation of the committee. It was to the effect that the corporation could purchase the works on giving three months notice. The purchase of lands to be completed in one year, and the works to be completed in three years.

The clause was agreed to by the committee, who rejected a clause proposed by Mr. Michael on behalf of the corporation. The other clauses of the bill were agreed to without alteration, and the bill passed.

HOUSE OF COMMONS COMMITTEE.

TUESDAY, APRIL 20.

(*Before Mr.* A. W. PEEL, *Chairman; Mr.* RANDALL PLUNKETT, *Mr.* HOLMS, *and Captain* POLHILL-TURNER.)

STOCKTON AND MIDDLESBROUGH WATER BILL.

Mr. GRANVILLE SOMERSET, Q.C., Mr. LITTLER, Q.C., Mr. RICHARDS, Q.C., and Mr. LUCK appeared for the promoters. The bill was opposed by the Corporation of Middlesbrough, for whom Mr. STEVENS and Mr. BROWNE appeared; by the Tees Conservators, represented by Mr. BIDDER, Q.C., and

Mr. MICHAEL; by the Stockton and Hartlepool Highway Board, for whom Mr. ASPINALL, Q.C., appeared; the Stockton Corporation were represented by Mr. VENABLES, Q.C., and Mr. STANLEY; the Tees Salmon Commissioners by Mr. PATERSON; and Mr. Surtees by Mr. MICHAEL.

Mr. SOMERSET, in opening the case, said the object of the bill was to extend the limits within which the Stockton and Middlesbrough Water-Works Company might supply water, and for empowering them to construct additional works, and to raise additional capital; to alter and amend their existing acts, and for other purposes. The preamble of the bill stated that the Stockton and Middlesbrough Water-Works Company was established in 1854, incorporated in 1858, and in 1864 the powers of the company were extended. The share capital of the company at present consisted of £250,387 10s., the shares having all been paid up, and it was considered expedient that the several classes should be consolidated, and that the works of the company should be extended. The particular section of the existing Act which it was desired to repeal was one limiting the quantity of water to be taken from the Tees to 60 million gallons per week. [The learned counsel then explained, by means of a plan, the line of pipes proposed to be laid down.] The works proposed are a suction-pipe from the river Tees to a pumping station and engine-house, from which a line of pipes will go to Thornaby. There will be a service reservoir at Sadberge, a line of pipes from Preston-upon-Tees to Ormesby, a pumping station and service reservoir at Ormesby, a line of pipes from Ormesby to Normanby, and a service reservoir at Normanby. The company did not supply Darlington, which had water-works of its own, and could not at present supply Normanby and other places for want of water. About 40 years ago, where Middlesbrough now stands, there were 18 cottages, now there is a population of about 60,000 or more. Stockton, also was a large and increasing town. In fact, the whole district to Redcar had about the most prosperous and increasing population in England, but if water could not be obtained it would be very much retarded. In 1864, the population of the whole district supplied by the company was about 50,000, and now it is about 150,000. Originally water was taken from the Tees alone; but in 1864 power was sought to take more water, and the company agreed to be limited by section 9 of the Act to 60 million gallons per week from the river Tees. Although the population had so largely increased, the consumption of water had increased still more largely, for while in December, 1864, it was 13 million gallons per week, in March, 1875, it was 55 million gallons per week. The public must be supplied, and it was impossible to do so without further powers. Between Stockton and Redcar there are about 100 blast furnaces, besides other works. The bill sought powers to take more water from the Tees, and that was the point on which there was the most opposition. It was the only place from which the water could be taken, yet the company were asked to give a greater supply, and not to raise the price. There was no opposition to the proposal for consolidating the shares, but there was to the quality of water, the taking of more water from the Tees, and to the laying down of the new pipes, which, it was alleged, would interfere with the roads in Stockton and Middlesbrough. The latter objection he was surprised to hear put forward, as the local authorities had the power to regulate this. Another objection was that one of the pipes would interfere with the bed of the Tees; but it would lie as far below the bed of the river as the petitioners required. The petition of the Middlesbrough Corporation was a comprehensive one, and when it was disposed of the rest would almost follow. They asked that the company should be compelled to supply for trade purposes; but he had not heard that there were any complaints on this ground, and besides, it was not usual to insert compulsory clauses in such bills. They also said they must strenuously resist the proposed changes, but he did not know that it was proposed to vary the clauses of the former Acts, except with regard to taking the water from the Tees. They also set forth that the population was solely dependent on the company for their water supply; but that was the reason for asking the extension, as the company were now within 5 million gallons of their limits, and might even reach their limits before the bill was out of committee. It was further said that Barnard Castle, and other towns referred to, situated above the point at which the company proposed to draw their supply, discharged their sewage into the river, and the water was so full of sewage that no filter-beds could purify it. Mr. Hawksley and other engineers would be able to set them right on this point, however. The petitioners further asked for a specified standard of purity, but he did not know what that meant, as the company were now bound to supply pure and wholesome water. It was not sought to extend the limits as regarded Normanby; but, practically, they would be extended, as the place could not be supplied at present for want of water. The petitioners further said that the old works were not all completed; but he was instructed that there was no foundation for this allegation. As regarded Yarm, the sanitary authorities are proposing to pump from the river for their own supply. They alleged in their petition that the rates were high, and, consequently, prejudicial to the health and best interests of the inhabitants; but if they were going to rely on newspaper reports of sickness, he should object, unless the parties themselves appeared with them. He denied that the company had been guilty of *laches*, and said that this disposed of the Middlesbrough petition.

WEDNESDAY, APRIL 21.

Mr. SOMERSET resumed his opening address on behalf of the promoters, and referred to the petition of the Corporation of Stockton and South Stockton Local Board. The tide flowed up the Tees above Yarm, and therefore Stockton was within the tidal flow. The carrying of the pipes could not, as was alleged, seriously interrupt or impede the traffic of the town, as the laying of them would be regulated by the local authorities. The next allegation was that the sewage of the towns of Darlington, Stockton, South Stockton, Middlesbrough, and of other important places, flowed into the river, and the water coming down had hitherto sufficed to keep it comparatively innocuous; but if there was further abstraction the sewage would deposit on the banks, and so cause disease. But an injunction has been obtained against Darlington, and the Corporation of that town were taking steps to dispose of their sewage in some other way. Besides, the towns named were below the point at which it was proposed to take water. It was rather an extraordinary thing that those towns, which by their misconduct put sewage into the river, should object to the promoters taking the pure water further up. With regard to the extension of the limits of supply, Normanby was within the limits already, but the company cannot supply it on account of want of water. With regard to Hurworth, the promoters were the only company who could supply that district, and therefore they include it in this bill. The third district was Redmarshall and Stillington, where the inhabitants wish for the supply, as they cannot get it elsewhere. The petitioners also objected to the pipe going on to the bed of the river Tees; but it would be put as deep in the bed of the river as they liked. As to the alleged engineering difficulties, Mr. Hawksley and the other witnesses will speak to that point. The next petition was the Stockton and Hartlepool Highway Board; but it had the seal of the Stockton Corporation, and so was really another petition from them. The next was the Tees Salmon Fishery Board and others, and these gentlemen were of eminence and position. They objected to the scour and the sewage, and that the scheme would destroy the fishing; but there was no wish to destroy the salmon, and it was unnecessary to go into the question. The committee would be conversant with how salmon existed, and witnesses would show that no possible harm could be done to them. The next was the petition of the Tees Conservancy Commissioners, who objected to the pipe across the river; but he believed there were no ships at that point, and the pipe would be put as low in the bed as they liked. They also objected to section 9 of the Act of 1864 being repealed. By that section the limit of water to be taken from the Tees was fixed at 60 million gallons, but the consumption was already 55 millions. No one thought at the time that the Cleveland district would so marvellously increase, and there ought to have been a proviso to the clause that the population of the district should not increase in more than a certain ratio. The question for the committee would be whether this was the proper place to go for the water, and whether it would be of sufficient purity. There was then the petition of two gentlemen, Mr. Alfred Wright Surtees, and the Rev. Scott Frederick Surtees, of Dinsdale, who object to the restriction being taken away, as it would injure them without giving compensation. But everyboby seemed to agree that more water was wanted. There was one more petition, that of the Local Board of Normanby, in favour of the bill. The population of that town is 6000 or 7000, who want water very much, and who are anxious that this bill should pass.

Mr. *John H. Bourman*, examined by Mr. LUCK, said he was a magistrate at Darlington, and managing director of the promoters company, the paid-up capital of which—£258,387 10s.—had all been expended. He described the various classes of shareholders, and said it was proposed to raise £300,000 additional share capital, to enable the company to supply the increasing wants of the district. At present the population dependent on the company for a supply of water was from 120,000 to 140,000. The intake of water from the Tees was at Tees Cottage, with a service reservoir at Fighting Cocks, and the pipes went down to Redcar. The effect on the interests of the district, if an adequate supply of water could not be given, would be that it would very soon come to a dead-lock. The average consumption in 1864 was about 13 million gallons per week, and that had increased until this year it averaged 55 million gallons, and one week this year they pumped up about 62 million gallons. Unless they could get additional water they could take no more customers, and would have to put a restriction on their present consumers. The town of Darlington took water immediately below the Middlesbrough Company, and they had no restriction whatever. The quality of the water was very good, and he used it invariably, although he had an excellent well on the premises. The water supplied for trade purposes to the Cleveland district was about 33 million gallons per week. It was proposed to consolidate the shares of the company, and make a uniform 5 per cent. stock.

Cross-examined by Mr. STANLEY: If the development went on they might want an increasing quantity every year of six million gallons a week, or even more than that. The population westward was gradually diminishing, as the people migrated down the river. There was still a large population, but widely scattered, up the Tees. He could not say how Barnard Castle was supplied with water, but he believed it was from a beck at the back of the town, not from the Tees. There was a choleraic outbreak there a few years ago, but he did not know that was the reason they sought a more pure supply than the Tees. The Shildon Company supplied a similar population. Darlington took from the Tees about 7½ to 9 million gallons a week, and was subject to no limitation. A considerable portion was taken for manufacturing purposes, but there had been no increase in consumption during the past twelve months. The charges for manufacturing purposes by the promoters company were restricted to 3d. per 1000 gallons, but he could not say what were the charges for sanitary purposes. His impression was that they were moderate. When the fire brigade had been out practising in Stockton, he had never heard that there had not been sufficient pressure. In case of accident it might have occurred. When repairs were being made, in some cases notice was not given of the supply being cut off, but that was owing to the neglect of the officials. It would be remarkable if the depth of water in the tidal flow of the river was not sometimes very low. That was due, not to the abstraction of water, but to the dredging operations, which made a greater scour.

By Mr. BROWNE: There had been only rare complaints in Middlesbrough of turning the water on and off without notice. If the inhabitants had cisterns there would be no inconvenience in this. He did not think, even if waste could be prevented, that the quantity of water they were now entitled to take would be sufficient to meet all requirements for the next 50 years. The total receipts of the company did not exceed 4d. per 1000 gallons. The company had six different issues of shares. The amount of capital paid up on the original shares was £182,572 10s. He was well acquainted with the river into which the sewage flowed, but it was subjected to mechanical filtration, which took most of the impurities out, at any rate. He constantly drank the Darlington water, which was not so well filtered as the Middlesbrough water. He had not a filter in his own house. He did not know of any other place to get better water from.

Mr. LITTLER objected to this evidence, on the ground that it was going into an alternative scheme.

Mr. BROWNE said he was prepared to prove that much better water could be had at a place nearer to Middlesbrough. His clients were considering going to another source of supply, south of Middlesbrough, and that alternative scheme was given in their present petition. In one place they said, if the water of the Tees was to be taken at all, it should be above Middleton-in-Teesdale; but the alternative source of supply, to which his clients were prepared to go, was south of Middlesbrough, where there was a great rainfall, and an extensive gathering-ground.

The CHAIRMAN said the committee thought, if a definite place had been referred to, it would have been an alternative scheme; but as it was, it was too vague. Neither of the clauses specified a sufficiently definite scheme.

Witness, further cross-examined, said he did not know that the tide running up stopped the flow of sewage, and made it offensive to the towns of Stockton and Middlesbrough. The filter-beds were not choked up by being overworked, but they might be by a flood. The water was occasionally discoloured by the peat, which mechanical filtration would not remove.

By Mr. PATERSON: There were three large reservoirs at Fighting Cocks, which held a supply for about two days. The question of extending the supply had been discussed for two or three years, but there was no doubt as to the source of that supply. If it were taken from the higher part of the Tees, a number of millowners would have to be compensated; but the principal objection was the excessive cost of purchasing the land, erecting reservoirs, and bringing down the pipes.

By Mr. ASPINALL: The company's pipes went over from 15 to 20 miles of public roads or turnpikes.

By Mr. MICHAEL: Witness knew Mr. Surtees property at Dinsdale. In removing the clause of the bill of 1864, limiting the water to be taken from the Tees, they proposed there should be no limit to the abstraction of water. The additional water to be abstracted from the river would, in all probability, go to Dinsdale mill. He had not considered the effect upon the fishery. With regard to the pipe crossing the Tees, the engineer would speak to it. He was not aware of any negotiations with the commissioners.

Re-examined by Mr. LITTLER: The proposal to place the pipe beneath the bed of the river was a reasonable one. If Barnard Castle polluted the river, the higher up they went, and the nearer to Barnard Castle, the more sewage they would get. The highest pressure to be given in Middlesbrough by the Act of 1864 was that given by the Fighting Cocks reservoir. He was not aware of any complaint as to the scale of charges, and, except in case of an accident or a pipe becoming too small, there was no complaint as to the supply. Those were complaints to which any company would be liable. If the sewage made the river bad, then Stockton and Middlesbrough ought to divert their sewage. Indeed, all large towns ought to be compelled to dispose of their sewage in some other way than into the rivers.

By the COMMITTEE: There were no places of importance above Ronaldkirk.

The population above the pumping station was about 100,000 altogether. That was the population of the parishes, and not those alone on the banks of the river. The sewage would flow down the river, unless precipitated in its passage; but the deposit in the company's subsiding-tanks was very small.

Mr. *H. Pease*, formerly M.P. for South Durham, was the next witness examined by Mr. SOMERSET: He said he resided at Stanhope Castle, and was chairman of the Stockton and Middlesbrough Water-Works Company. The district was without a proper supply of water before the formation of the company. They now asked for the limitation of the Act of 1864 to be taken away, because they had almost reached that limit, and if they had no further power of supply, the increase and trade of the district must stop.

Cross-examined by Mr. STANLEY: No doubt if more water was pumped from the river, there would be less going down in dry seasons. He questioned whether any place but Barnard Castle, above the pumping station, was drained into the Tees, as there were no appliances. If Darlington increased, they also might take more water.

By Mr. BROWNE: It was not so much to the interest of the company as of the public that this bill should pass. The company would be better without the bill at all. If half the water in the river were abstracted there would still be sufficient. He recently made some remarks as to the condition of the company, and said that the pumping for the previous half year was 49 million gallons per week; but that had since been increased. It was no doubt desirable that the bed of the river should have a scour in dry weather. The water at Darlington never required private filtering. It was sometimes discoloured a little from the peat.

By Mr. PATERSON: It had been discussed whether the water should be taken from some other place than Tees Cottage, but no scheme worthy of consideration had ever been presented. The question of it affecting the fishery was not believed in that part of the country.

By Mr. MICHAEL: It was not proposed to pay the Tees Commissioners for the water to be abstracted.

Mr. *Jeremiah Head*, examined by Mr. LITTLER, said he lived at Cotham, and was managing partner at Fox, Head, and Co.'s works. They used water for 23 boilers, and were obliged to use some water drawn from the river, but not for boiler purposes, as it was too impure, and encrusted the boilers. They always used the company's water for the boilers. They used it at his own house for drinking and domestic purposes. It was most certainly the best water in the neighbourhood. There were on his works both soft and hard water pumps, but he used the company's water in preference, and never heard of any illness attributable to it. The company supplied the district very well. He had inspected some water lately, and found no traces of organic matter in the filtered water. He found no living creatures in the unfiltered water, but he found some peaty matter. He evaporated the water and found a crystalline matter, apparently a sort of lime. Witness spoke to the large increase of blast-furnaces and other works in the district, which had cost a great deal of money. Water was essential to the trade, and unless there was a full supply the population could find little work. About 40 or 50 years ago, Middlesbrough consisted of a single farmhouse.

Cross-examined by Mr. STANLEY: The water was generally taken from the river for the works, at the top of the tide, when there would be some sea water.

By Mr. MICHAEL: I examined a single drop of the water at a time. There is no mineral residue in absolutely pure water, but I did not expect to find this pure.

Mr. *William Jones*, of the firm of Jones, Dunning, and Co., Middlesbrough, chemical manufacturers, and formerly secretary to the company, examined by Mr. LITTLER, said pure water was required in order to make Epsom salts and oxalic acid. The company's water was used for the manufacture. It was also well adapted for the steam boilers, which was a test of its being good. He had known several cases of people being medically advised to use the company's instead of spring water. There had been a prejudice against it in Stockton, but that had been overcome.

Cross-examined by Mr. MICHAEL: There was no sewage poured into the river between the pumping station and Barnard Castle. No analysis would detect the poison germs of disease in the water. His firm used more than five million gallons a quarter.

Mr. *Henry Cochrane*, examined by Mr. LITTLER, said he was an ironmaster at Middlesbrough, using the company's water in his works and his house. He had never heard of it disagreeing with any one. If Middlesbrough were to go on thriving as it had done, there must be an almost unlimited supply of water. He had no ground for finding fault with either the quantity or the quality of the water supplied to either his works or his house.

Mr. LITTLER put in a table to show that the population above the pumping station had decreased lately.

Mr. *William Hanson*, ironmaster at Middlesbrough, examined by Mr. LITTLER, said he was quite satisfied with the water, and generally agreed with the views of the previous witness.

Cross-examined by Mr. BELK: He filtered the water which he used at home.

THURSDAY, APRIL 22.

Mr. *John Gjers*, of the firm of Messrs. Gjers, Mills, and Co., examined by Mr. RICHARDS, said he had been managing engineer for some time to Messrs. Hopkins, Gilkes, and Co. In starting works, ironmasters always ascertained whether or not there was a good supply of water. Unless there had been a good supply, the iron-works would not have been established. Tidal river water was entirely unsuited for boiler purposes, from the fact of the salt water causing encrustation. A want of water was threatened at present, and such a state of things was calculated to prevent development of the district. Indeed, a fresh supply was absolutely desirable as soon as possible, and no one could supply it so soon as the present company, who had the pipes laid down. The consumption at their works for the last three years was 69 million gallons, for which they paid £974 13s. 6d. The terms for the water were very reasonable, the price being on a sliding scale. He knew of no other available source of water at present. His view on this subject was generally shared in the district. He drank the water, and found it of a fair average quality. He had nothing to complain of.

Cross-examined by Mr. VENABLES: Their works were on the banks of the river, and the river water was pumped up when very pure water was not required. The more fresh water that came down the river, the less high would the salt water go; but it would continue salt so as to make it useless for some purposes.

By Mr. BROWNE: The quality of the water was essential to his works. There was sometimes a deficiency in the pressure of the water, but, as there was a steam fire-engine at Middlesbrough, it would not be of so much importance in case of a fire. For drinking purposes he filtered the water. He was not aware of any cholera or typhoid fever up the stream since he began using the water. There was no large source where water could be got besides Tees Cottage.

By Mr. PATERSON: He had not examined the upper part of the Tees, to see whether there was a likely source of supply there.

Re-examined by Mr. RICHARDS: The company's Act of 1864 provided for a pressure of 30 feet above the level of the Middlesbrough Market Place. When required by the local authorities, the company were to place stand-pipes near the works. There were other places where they do not drink Tees water, and yet suffered from typhoid fever.

Mr. *Charles Henry Minchen*, examined by Mr. RICHARDS, said he was a land agent, and agent to the trustees of the Normanby Settled Estates. He was a member of the local board, which had unanimously petitioned in favour of this bill. The district was dreadfully in want of water, and had suffered from fever, which might have been prevented if they had a good supply of water. The streams of the district had entirely disappeared, owing to the mining operations of late years. One stream became very bad before it disappeared. The water accumulated at the bottom of the mines, and was pumped out in a state of great impurity. There was no water for the closets, and the wells were so impure that the local board were compelled to close them. They were very anxious in the district to be supplied by the company with water, as it was within the limits of supply. At one of the farms there was no water, and the cattle had to be driven 1½ miles, four times a day, making 6 miles altogether, which was very injurious to them. Near the river a well had been sunk over 370 feet without finding a proper supply of water. Witness mentioned a number of places where there was great deficiency, and said they were quite unable to flush their sewers, an operation which was very necessary for sanitary purposes.

Dr. *Farquharson*, Stockton, examined by Mr. RICHARDS, said he used the company's water, and found it good. The district was singularly free from bladder and kidney diseases, which was an indication of the purity and goodness of water, and an absence of calcareous matter in it. There had been a good deal of typhoid fever, but no more than in other districts. He would be more inclined to connect it with bad drainage and overcrowding than with the water supply. He had not examined the water chemically to know whether there was any sewage in it, but he had not observed any deleterious effect upon those who used it. If he thought there was any sewage in it he would not drink it. Many of the other doctors in Stockton used the water.

Cross-examined by Mr. VENABLES: Hard water would be bad for bladder and kidney diseases, and softness was an advantage quite apart from contamination of any sort. After a heavy rain, the water had the appearance of weak tea; it was not very pleasant to the eye, but he did not think it injurious, and a filter removed the colour. His opinion was that the tumbling about the bed of the river the water got between Barnard Castle and the pumping station freed it from any sewage matter which it might have received.

By Mr. BROWNE: He had given a certificate to the Corporation of Stockton in favour of some other water at Osmotherly, which was even better than the Tees water, but there was not a sufficient supply. He said at a public meeting that people who suffered from kidney diseases would rather drink the soft water of the Tees than any other in the district; but he did not say that it acted as an aperient. The atmosphere is Nature's great laboratory for purifying water, or it would be a bad thing for the people of Stockton. He always filtered the water before drinking it, and probably often filtered it when it was quite pure.

Re-examined by Mr. RICHARDS: He did not attribute the mortality at Stockton in any way to the water supply.

Dr. *John Ellerton*, of Middlesbrough, and a magistrate of the borough, examined by Mr. RICHARDS, said the town had frequently been visited by epidemics, more especially the district west of Boundary Road, through which Newport beck ran. This stream was about six feet wide and one or two feet deep, running through a densely populated part of the town, and quite uncovered. It disseminated disease right and left. He had come to that conclusion after taking great pains to trace the cause of the disease, and he had found that it was not in any way due to the water, which was good and wholesome. He used it without filtration, and the discoloration after a heavy rain was due to the peaty district it came from. It was not, however, at all unwholesome on that account. The discoloration was only occasional, and not constant. The corporation had been guilty of great carelessness in their treatment of Newport beck.

By Mr. MICHAEL: He had not analyzed the water, but was of opinion that the discoloration was peaty. If there was sewage matter in it, they would have seen the effects of drinking the water, in the form of disease in the town. The beck was generally a stagnant stream. One cause of zymotic disease was bad water, and another was sewer gas, which could be given off from such a stream as the beck. Neither sulphuretted hydrogen nor carbonic acid gas would produce zymotic disease; but there were some poisonous germs which were given off by sewer gas. He could not explain how those germs were given off from the water.

By Mr. BROWNE: The Corporation of Middlesbrough are making new drainage arrangements which he believed would remedy the beck nuisance. There were other parts of the town through which the beck ran that were more thickly populated. There had been fever in Gunnergate Terrace, where he resided. In every house where it occurred the drains were found to be imperfect. His drains were imperfect, and he had them remedied. Water was the principal carrier of the germs he had spoken of. He would not advise any one to depend on mechanical filtration if any zymotic disease were raging along the river.

Re-examined by Mr. RICHARDS: He did not believe that any fear of injury need be entertained as to the sewage coming from Barnard Castle, as it would be dissipated and disposed of altogether, by some mysterious process of air or water, before reaching the pumping station. He drank the water himself, and recommended it to his patients.

By the COMMITTEE: The mortality of Middlesbrough last year was about 25 in the 1000.

Mr. *John Morrell*, of Darlington, said that he had drunk the Tees water for many years, and considered it good. An increased supply was essential to the welfare of the town.

Mr. *Samuel Richardson*, examined by Mr. LUCK, said a week ago he had examined the river up to Middleton-in-Teesdale to ascertain whether any sewage from the houses flowed into the river. There was no drainage into the river from any of the villages. With the exception of Barnard Castle and Gainford, there was no perceptible drainage whatever. The bed of the river was of a very rocky and uneven nature, with several waterfalls, the effect of which would be to thoroughly expose all the water to the action of the atmosphere, and thus to render it pure. He had drunk the water almost every day for ten years, and was none the worse for it. He used no filters.

Cross-examined by Mr. STANLEY: He did not observe at Middleton-in-Teesdale that the sewage found its way through a small beck to the river. He principally examined the small villages and farmhouses.

Mr. *George Webster*, president of the Tees Angling Association, examined by Mr. SOMERSET, said he had no fear whatever that the abstraction of the water as proposed would have any injurious effect on the salmon fishing.

Cross-examined by Mr. PATERSON: He had not fished for salmon in July, as the nets at the mouth of the river took nearly all the fish before they could get up.

By Mr. MICHAEL: He knew the fish-pass of Mr. Surtees in the river. Last year, in the summer months, the river was very dry.

Mr. *John H. Bell*, of Darlington, one of the four elected conservators of the Tees Conservancy Board, examined by Mr. SOMERSET, described the mode in which some of the conservators were elected, while others, as members of public bodies, were nominated *ex officio*. The board, he understood, had petitioned against the bill, but he was not a party to the petition. There was a division on the subject, and it was decided by the majority that a petition should be presented.

Dr. *Henry Letheby*, examined by Mr. SOMERSET, said he was professor of chemistry at the London Hospital, and for nearly 20 years had been medical officer of health and public analyst for the City of London. He was well acquainted with the river Tees, and with the water supplied from the river to Darlington, Stockton, and Middlesbrough. He had on two occasions been to the works of

the company and examined them very carefully, and also the state of the river as high up as Middleton-in-Teesdale. He took a sample of the water there, and others at Barnard Castle, Darlington—when it was going into the water-works—Yarm, and from the reservoirs and main pipes of the company. [The results of these analyses were stated in a table which was put in.] The proportion of actual ammonia only amounted to 2-100th parts of a grain at Middleton-in-Teesdale, and very little more at Yarm. That proportion was insignificant. The London water contained as much. The proportion of ammonia from organic matter was again found to be small. Of nitrogen as nitrates the proportion was not discoverable, there was the merest trace all through. At Middleton-in-Teesdale the solid matter to the gallon was little more than 7 grains, it was 8 grains at Barnard Castle, and 9 grains at the water-works. At Yarm it was rather more than 13½ grains. The organic matter was less at Yarm than at Middleton, showing that it had undergone oxidation in its progress down the river.

By Mr. LITTLER: The hardness of the water was 4·8 degrees at Middleton, 5·6 at Barnard Castle, 6·4 at the water-works, and 9 at Yarm; after boiling half an hour the hardness was decreased between 3 and 4·7 degrees. The general result was that the water at the works was a very excellent potable water. The water was turbid as it came from the river, but the samples taken from the supply reservoir and from taps in Stockton and Middlesbrough were all bright. He had especially inquired into the amount of sewage sent into the river from places above Stockton, and, excepting at Barnard Castle, where there were some drains and manufactories on the banks, there was, along the course of the river, no system of regular drainage at all. At Gainford, where there were more houses on the bank than anywhere, no sewage entered the river. With the houses away from the river, the sewage soaked into the ground some distance before it reached the water. There was no pollution of the becks feeding the river. The vegetation was healthy, and fish in abundance at Barnard Castle, where there were one or two dye-works on the banks, mostly using water for washing, but it did not appear there was any drainage of importance from them. The town was 16½ miles above the water-works, and he was perfectly sure, from experience, that no particle of anything in the way of pollution, that got in at Barnard Castle, was ever to be found, in any shape whatever, at Darlington. His attention had been drawn to the theory of some chemists that water does not oxidize as it travels; but he knew that, if water did not purify naturally, it would never be fit to drink at all. For example, the water of the Trent, at Burton, was black, and there was neither vegetation nor fish; nevertheless, 30 or 40 miles down that stream, the vegetation was healthy, fish abundant, and the water clear and perfectly wholesome and pure, with no trace of the horrid pollution as at Burton. Below the water-works, the first place where there was any noticeable or important pollution was at the Skirn, which received the sewage of Darlington. It was a very filthy stream, but after it had gone 30 or 40 yards into the river Tees the sewer fungus—an unmistakeable sign of any tangible quantity of sewage—was not to be found, and the fish were about the water. Darlington was under an injunction to keep as much of their sewage out of the Skirn as it can. The Skirn is 4½ miles below the company's intake, down to which point there was really no evidence of any pollution that could be regarded as endangering the public health, or in any way injuring the water. He did not think that, by taking out a larger quantity of water from the Tees, it would throw so much pollution on the lower part of the river that it would seriously affect the public health. Barnard Castle was not a place that was systematically drained, and there was nothing that would indicate that at any one point a great quantity of sewage was poured into the river. The largest place was something like 16 miles above the intake; and even if the smaller places between did drain into the river, the water would not be affected. He thought the river would get better, because the progress of sanitary measures was to do away with drainage into rivers altogether.

Cross-examined by Mr. STANLEY: When he examined the river, it appeared to be at about half flow—rather below the average, he was told. At Middleton-in-Teesdale there was drainage of a few houses into a beck which flowed into the river. He did not see a large main sewer discharging direct into the river. There was a tannery at Barnard Castle discharging into the river, but he did not know that the sewage of the town all flowed into the river half a mile lower down. He was told there was at Gainford a sewer not in use connected with the river, but there have been proceedings, taken by the water company against the local board, to prevent their using the pipe. He would go as far as to say that this was one of the best waters in England. He could no more detect either typhoid or choleraic germs passing into water than he could detect an idea by analyzing a man's brain. The progress of knowledge was rather to upset the theory that there were such things as these living germs. He would not mind drinking the water of a river into which sewage had gone, provided the water was 20 times the volume of the sewage, and that the river, having gone 20 miles, had healthy vegetation on its banks and fish in the water; and he would defy any one, except as a matter of speculation, to say there was a single fact in support of a possible danger from such a cause. These theories were started by analytical chemists, who had no knowledge of physiology, and they did not emanate from men who were really conversant with the sanitary facts of the case.

By Mr. BROWNE: The getting rid of the sewage was effected by oxidation, by precipitation, and by the feeding of both plants and animals in the river, which was a very similar process to that performed artificially by filtering through carbon, or any porous material. Chemical filtration got rid of some of the impurities in exactly the same way that the natural process of rolling the water down the stream did. He considered the theory of living disease-germs a subject open to discussion, and to his mind the progress of comparatively recent investigations tended to show that the diseases might arise, not from germs, but absolutely from a chemical compound. Since last year, the investigation of Dr. Bastian, and very recently indeed of Dr. Richardson, had so astonished him, that, thinking them deserving of great consideration, he should withhold his opinion on the subject.

Re-examined by Mr. LITTLER: He had no hesitation in saying most positively that there was no danger likely to arise from the use of water under the circumstances he had mentioned, and certainly none in the present instance. On the contrary, it was an excellent drinkable water.

By the COMMITTEE: The proportions of carbonate of lime and magnesia, and sulphate of lime and magnesia, were much greater at Yarm than at Middleton-in-Teesdale. This arose from the fact that between these two places some of the becks discharging into the river were largely charged with carbonates. This would have no effect whatever on the healthy quality of the water.

(To be continued.)

GAS MEN OFF DUTY IN AUSTRALIA.—The men from the town office and store of the South Australian Gas Company held their annual picnic on Friday, the 19th of February. They left the company's offices at about half-past seven with their friends in three of Cobb and Co.'s omnibuses, accompanied by the Concordia band, for the scene of the day's sports at Reynella. On the way they stopped at Cockburn's Inn, on the South Road, to breakfast, reaching Reynella at about eleven o'clock, where cricket, croquet, Aunt Sally, and various other games were improvised, and dinner was provided at the Crown Inn by Host Leighton. The health of Mr. Anderson, the engineer, Mrs. Anderson and family, the secretary, Mr. Paxton, and family, the foreman, Mr. Wm. Thomas, and family, were proposed and heartily drunk. In the evening dancing was engaged in and kept up till towards morning, when a return was made to town, which was not reached till after daylight.—*Adelaide Observer.*

Legal Intelligence.

COURT OF CHANCERY.—FRIDAY, MAY 28.

(Before Vice-Chancellor HALL.)

In re THE AIR GASLIGHT COMPANY.

This is a petition for winding up the company presented by the Messrs. Harrison. On the matter being called on by the registrar,

Mr. OSBORNE MORGAN, Q.C. (with whom was Mr. W. W. KARSLAKE), asked, on behalf of the company, that the petition might stand till next petition-day, in order to enable them to cross-examine witnesses.

Mr. DICKINSON, Q.C. (with whom was Mr. GRAHAM HASTINGS), for the petition, inquired whether it was intended to cross-examine the petitioner.

Mr. O. MORGAN said it was, and he also wished the petition to stand over, as a general meeting was called for the 3rd of June, at which some arrangement might be come to.

The VICE-CHANCELLOR thought in that case the petition had better stand till the last petition-day in term.

Mr. DICKINSON said he could not agree to that, although he was willing to let the matter stand over for a week.

Mr. O. MORGAN: Very well, the petition will stand over for a week.

(Before the MASTER OF THE ROLLS.)

RUSSELL *v.* THE WAKEFIELD WATER-WORKS COMPANY.

This was a bill filed by Mr. Russell, a proprietor of shares in the Wakefield Water-Works Company, the object of which was to obtain repayment to the company of a sum of £5500, paid by the directors of the company to the promoters of a new company which was brought forward in 1874, under an agreement that the bill promoted by the latter should be abandoned. The bill alleged that this agreement was corruptly entered into, and that the directors had no authority to enter into it, or to apply the funds of the company in such a way.

Mr. CHITTY and Mr. W. COOPER appeared in support of the bill, and Mr. BAGSHAWE and Mr. BUNTING for the company, who demurred to the bill generally.

The MASTER of the ROLLS, after hearing arguments at considerable length, said he was clearly of opinion that the bill was open to general demurrer, and on two grounds, though it might be capable of amendment, for which he should give leave. The bill sought to make the directors personally liable, on the ground that they had no power to pay the money; and the objections to the frame of the bill, which he considered to be well founded, were these:—In the first place, there was not sufficient allegation that the act complained of was beyond the powers of the old company; and, secondly, even if it were, it was a case in which the old company itself, being an incorporated company, was the proper party to sue. On the first point, the only allegation was that the powers of the company, as conferred by certain Acts of Parliament, were to raise money for the purpose of executing works, and so on; but it did not state that those were the only Acts which would apply; and it appeared in the course of the argument that there was another Act, passed in 1874, which was not stated, and, therefore, by looking merely at the Acts stated in the bill, it was impossible to know what the powers of the directors were. In the next place, he could not find out what was complained of. What was stated was that the promoters of the new bill, on or about the 9th of April, withdrew their bill, the withdrawal being the result of a corrupt agreement made between the promoters of the bill and the directors of the old company. But it did not allege that the agreement was corrupt, and that sort of inferential allegation was not sufficient. It stated the form of the agreement between the Wakefield Water-Works Company and the promoters of the new company, by which the directors of the old company pledged their word, as men of honour, to proceed with their present application to Parliament for powers to obtain a further supply of water, and to use their utmost endeavours to secure the passing of the bill, and to pay £5500 to the promoters for the expense of the abandoned bill. He did not think that was an obligation to pay the money independently of obtaining the bill, but that it meant they would endeavour to get a bill which would authorize them to make the payment. He did not think it made the directors personally liable, though when he had the facts more fully stated, he should be able to judge of that question better. However, that agreement was signed by the directors of the old company and the promoters of the new one on the 7th of April, 1874, and on or about that date the money was paid. It certainly seemed singular that, although the agreement was to pay in future, the money was paid immediately; but it might have been so. Then the bill alleged that the promoters well knew that that sum was paid out of the funds of the old company, and that they well knew that there was no authority to make such a payment; but, strangely enough, it did not state as a fact that there was no authority, and then it appeared that another Act of Parliament had been passed since, which might have authorized the payment, and there was no allegation that it did not. Then the plaintiff "insisted" that the transaction was illegal, but did not state as a fact that it was so. That was not the right way to state a case in equity. The facts must be stated, and then the court would draw the legal inference; but here the legal result was stated without giving the facts which would support it. It was not sufficient to charge a thing as a fraud, but the facts must be shown which constituted the fraud. On a general demurrer, he was bound to take the allegations most strongly against the pleader. Mr. Chitty had drawn attention to the fact that there was a public Act affecting this company which contained very wide terms as to the payment of the costs relating to obtaining the Act, and unless he knew the facts, and exactly what this money was paid for, he could not say whether or not the payments came within that clause or not. That, therefore, was quite sufficient to allow the demurrer, with leave to amend. Then a great deal of the argument had turned on what in one sense might be termed a technical objection; and it was said that, as this was a bill to make a stranger pay back money belonging to a company, the proper person to sue was the owner of the trust-fund so alleged to have been fraudulently appropriated by the stranger, with notice of the trust. That, no doubt, was the general rule of the court; but, as was laid down by Lord Cottenham in the case of *Foss v. Harbottle* (in 2 Hare), "it is a rule subject to exception, and the exception depends very much on the necessity of the case, the necessity being the necessity for the court doing justice." Therefore, though, as a general rule, an individual member of a corporation could not sue to recover money or property belonging to an incorporated company, there were cases in which he might be allowed to do so; as, for instance, where the company itself refused or neglected to take proper proceedings, or where the money had been paid by the corporation itself under an *ultra vires* agreement, which the corporation endeavoured to uphold. It might be possible in the present case to show, though it had not been sufficiently alleged in the bill, that such circumstances existed; and on that branch of the case also there would be liberty to amend. The demurrer would be allowed on the usual terms, with leave to amend.

WANDSWORTH POLICE COURT.—WEDNESDAY, MAY 26.

(Before Mr. BRIDGE.)

UNLAWFULLY FIXING A METER.

Egbert Mitchell, of Lavender Hill, Battersea, was summoned for unlawfully fixing or altering the fittings of a meter belonging to the Phœnix Gas Company.

Mr. *Thomas Briggs*, chief inspector of the company, said the summons was taken out under 5 Geo. IV., clause 57. On the 8th inst. gas was laid on, agreeably to the defendant's request. He was told not to fix the meter, but witness afterwards found it fixed, with an escape which might have been productive of great damage.

The defendant elicited from the witness that an apology had been received.

Mr. BRIDGE said it was important that the public should be informed of the evil, but, as an apology had been sent, he suggested that the summons should be withdrawn on the payment of 2s.

The defendant paid the money, and the summons was withdrawn.

CORK POLICE COURT.—TUESDAY, MAY 25.

(*Before Messrs.* STARKIE *and* PERROTT.)

RECONNECTING A METER WITHOUT LEAVE.

Mr. *C. O'Sullivan* was summoned by the Cork Gas Company, on a charge of fraudulently using the company's gas, and of connecting his supply-pipe with the meter after the connexion had been cut off by the company.

Mr. M. J. HORGAN appeared for the complainants, and Mr. J. T. O'CONNELL for the defendant.

Mr. HORGAN said the defendant owed £141 9s. 7d. in March, and, as he refused to pay on the 29th of April, notice was sent him that if he did not do so the gas would be cut off. On that night accordingly the supply was cut off. The defendant came to Mr. O'Mahony, the accountant, with an offer of settlement, and in the course of conversation, mentioned that if the arrangement were made, he himself could restore the connexion. Mr. O'Mahony cautioned him not to do so, or that he would incur a penalty. On the next night, however, the gas was found blazing in Mr. O'Sullivan's two houses, and it was found in the meantime he had connected the pipe with the meter without the consent of the company. Under the 18th sec. of 10 Vict., cap. 15, any one laying a pipe to communicate with those of the company, without their consent, made himself liable to a penalty of £5.

Mr. *Barry*, collector to the company, was examined, and said the meter was cut off in consequence of the account not being paid. He was not aware, of his own knowledge, that the gas had been cut off, and had only the statement of another as to what Mr. O'Sullivan owed.

James Walsh stated that he was in the employment of the gas company. He cut off the meter in Mr. O'Sullivan's two houses on the 29th of April, and on the evening of the 30th he found the gas lighted in both places.

Cross-examined: I merely cut off the service-pipe supplying the meter; I did nothing to the meter.

Mr. *J. O'Mahony*, accountant to the company, stated that the meter was detached from the service-pipe on the order of the company for non-payment of gas money. The defendant after this made an offer of a certain amount of the money to have the supply renewed, but I told him I could not take it, but that I would take the whole if he paid it. He said he could make the connexion himself, but I cautioned him against doing so, and told him there was a heavy penalty attached to such a course.

Cross-examined by Mr. O'CONNELL: I did not believe he would make the connexion after this caution.

Mr. O'CONNELL submitted there was not a shadow of evidence that this was done with any intent to defraud the company. Mr. O'Sullivan was not exactly prepared to meet it when the company pounced down on him with this gas bill, and they immediately adopted this summary mode of dealing, leaving him sudddenly in the dark and unable to proceed with his business. There were actual negotiations going on to settle the bill and restore the supply, and in restoring it Mr. O'Sullivan did nothing stealthy or in the least degree fraudulent. It had actually been intimated to him since that if the amount were paid up he would hear no more of this, and he (Mr. O'Connell) asked the bench not to let the process of the court be used to enable the company to recover by the pressure of a criminal charge what they might recover by an ordinary civil remedy.

Mr. STARKIE said the magistrates did not consider there was any fraudulent intention in what had been done, but the defendant had acted wrongly in connecting the pipe, and they had decided on fining him £1, with 10s. costs.

Miscellaneous News.

METROPOLIS WATER SUPPLY.

The following are the returns of the Society of Medical Officers of Health on the composition and quality of the metropolitan waters in May, 1875:—

NAMES OF WATER COMPANIES.	Total Solid Matter per Gallon.	Oxygen required by Organic Matter, &c.	Nitrogen.		Hardness.	
			As Nitrates, &c.	As Ammonia.	Before Boiling.	After Boiling.
Thames Water Companies.	Grs.	Grs.	Grs.	Grs.	Degs.	Degs.
Grand Junction	18·67	0·059	0·169	0·000	13·5	3·8
West Middlesex	18·87	0·036	0·137	0·000	13·8	3·8
Southwark and Vauxhall	19·20	0·054	0·156	0·001	13·8	3·6
Chelsea	18·53	0·041	0·115	0·000	13·6	3·6
Lambeth	18·90	0·057	0·151	0·001	13·9	3·8
Other Companies.						
Kent	27·93	0·007	0·288	0·000	20·8	5·6
New River	17·81	0·015	0·147	0·000	13·5	3·3
East London	19·73	0·046	0·129	0·001	13·8	3·8

Note.—The amount of oxygen required to oxidize the organic matter, nitrites, &c., is determined by a standard solution of permanganate of potash acting for three hours; and in the case of the metropolitan waters the quantity of organic matter is about eight times the amount of oxygen required by it.

The water was found to be clear and nearly colourless in all cases but the following, when it was slightly turbid—namely, in those of the Grand Junction, the Southwark and Vauxhall, the Chelsea, and the Lambeth Companies. The average quantity of water supplied daily to the metropolis during the preceding month was, according to the returns of the water companies to the Society of Medical Officers of Health, 113,045,907 gallons; and the number of houses supplied was 517,200. This is at the rate of 32·8 gallons per head of the population daily. The last official return from Paris stated that the average daily supply per head of the population was 28·3 gallons; but this includes the water used for the public fountains, and for the ornamental waters in the Bois de Vincennes and the Bois de Boulogne. HY. LETHEBY, M.B.

THE GAS QUESTION IN MELBOURNE.—"The gas question," says the *Melbourne Telegraph*, "assumes a new form. At the last meeting of the city council a letter was read from the Melbourne Gas Company intimating that next year the clause in the colonial Act giving the council the power to purchase will come into operation, and asking the council if it means business. If so, the company offers to give every information in its power. The letter, we may hope, will not be passed over as a formality, but the council will make inquiries which may result in something hereafter, if not to-day. Municipal bodies are acquiring gas-works in England. Manchester is already supplied by the local council, and in London the Metropolitan Board of Works, after appointing a committee to consider the subject, have resolved to ask Parliament for power to buy the existing companies up, all or any of them, or to establish competing works of their own. At Dunedin, we believe also the local body has found it expedient to take over the gas-works. Gas and water, in fact, go very much together. The supply of both must practically be of the character of a monopoly, and it is a wholesome rule, beginning to be more and more recognized, that the only safe custodian of a monopoly is the community itself."—*Adelaide Observer.*

IMPERIAL CONTINENTAL GAS ASSOCIATION.

The Half-Yearly Ordinary Meeting of the proprietors of this Association was held at the City Terminus Hotel, Cannon Street, London, on Tuesday, May 25.

Sir MOSES MONTEFIORE, the president of the association, opened the proceedings. He said: Gentlemen, I am most happy in having the honour to attend this, which I believe to be the fiftieth meeting of the association. I have a favour to request of you, and it is one which I feel sure you will grant by acclamation. It is that my friend, Julian Goldsmid, M.P., do take the chair on this occasion.

The motion was at once adopted, and Mr. Julian Goldsmid took the chair.

The SECRETARY (Mr. Albert F. Jackson) read the advertisement convening the meeting, and also the following report of the directors:—

The present half-yearly ordinary meeting of the shareholders has been convened, agreeably to the company's Act of Parliament, for the purpose of receiving a report from the president and directors upon the affairs of the association, and for declaring a dividend for the half year ended the 31st day of December last.

Gas Made.—The total quantity of gas made at all the stations in the half year ended Dec. 31, 1874, was 2728 million cubic feet. The total quantity made in the corresponding half year of 1873 was 2601 million, being an increase of 127 million, or at the rate of 4·89 per cent.

Lights.—The total number of lights at all the stations on Dec. 31, 1874, was 1,087,549. The total number of lights on Dec. 31, 1873, was 1,011,919. These figures show an increase of 75,630, which is at the rate of 7·47 per cent.

The total length of mains laid up to Dec. 31, 1874, was 1185 miles, being an increase of nearly 28 miles on the corresponding half year of 1873.

There is nothing special to report as to the condition of the several stations. They were all in thorough repair and good working order, and proved sufficient for all requirements.

Mr. G. W. Drory has, with the able assistance of the engineers and agents at the several stations, superintended the conduct of the business and generally the affairs of the association on the Continent.

Both the rental and the profit for the half year ended the 31st of December last (1874), were greater than for the corresponding half year ended Dec. 31, 1873.

Coal.—The cost of the coal employed in the half year now under consideration was 3s. 8d. per ton less than during the corresponding half year of 1873.

Secondary Products.—The value of the secondary products—coke, tar, and ammonia—was 60 per cent. of the cost of the coal, being a decrease of 3 per cent. on the corresponding half of 1873.

At Antwerp, Brussels, Ghent, Hanover, Frankfort-on-the-Maine, and Vienna, a considerable outlay was necessarily incurred for enlarging and extending the mains.

At Aix-la-Chapelle, the new works at Haaren, to which allusion was made in the last report, were put into action in the month of October of last year, and have since continued working very satisfactorily. They will with small additions enable us to meet the increased and increasing demands for some time.

At Bordeaux the town authorities in the month of August last definitely agreed to the terms and conditions (their *cahier des charges*) for a new contract. This *cahier* was subsequently approved by the préfet. Tenders were accordingly invited. After a most careful examination of this *cahier des charges*, the directors found its terms and conditions such as precluded them from sending in any tender. One company alone (not a gas company, but a financial one) the "Société Financière," tendered upon the town's *cahier*, and on the 10th of November last, when the adjudication took place, obtained the new contract.

In accordance with the agreement between the town and this association, the "Société Financière" are bound to buy our entire works, mains, and other property at a valuation to be made by three experts—one to be named by themselves, another by this association, and a third by the préfet. The preliminary steps for the valuation are now in progress.

At Brussels the *expertise* to determine the amount to be paid by the authorities to the association for their town works, mains, and property, has been proceeded with, but is not concluded.

With regard to Cologne, the final adjustment and settlement of the outstanding accounts between the town and the association was concluded in December last.

At Haarlem, during the six months now under consideration, negotiations for a new contract were vigorously carried on, and have since been satisfactorily concluded.

At Vienna the negotiations, referred to in previous reports, for a renewal of the contract for public lighting, were continued. Early in the month of October visits of inspection and examination were made to several of the works there by engineers and others deputed by the town authorities. On the 24th of that month, in accordance with the terms of the existing contract, notification of the termination of the contract on Oct. 31, 1877, was given by the municipality. In the month of November two separate offers, or propositions, were made by the association to the town; one of these offers was declined. By the other the association, acceding to the request of the burgomaster and town's Gas Committee, held itself bound till the 21st of February last. Subsequently the Town Council determined to invite public tenders, and issued in December the terms and conditions for the tenders for the lighting. These underwent on the part of the association a most searching examination, both as to their financial and general results. The directors found themselves compelled to abstain from sending in a tender under these conditions, and decided to await the course of events.

The president and directors would now beg to draw the attention of the shareholders to the accounts for the half year ended the 31st of December last. From these accounts, which have been duly audited, the directors have, in accordance with the provisions of the Companies Clauses Consolidation Act, prepared a scheme showing the profits of the association for the past half year, and the portion thereof applicable to the purposes of dividend, which the president and directors recommend now to be declared—namely, a dividend of £2 per share, payable, free of income-tax, on and after the 15th of June next.

The directors have to announce with much regret the loss by death in November last of one of their colleagues, Mr. Benjamin Attwood, for many years connected with the management of the association, and desirous at all times to promote its interests.

Since the date for the closing of this report the company have also lost the valuable services of Mr. Wilkin, long a director of the association. To fill these two vacancies, and the one created by the death last year of Mr. J. C. Palmer, the board have elected Mr. Francis Bassett, Colonel Josiah Wilkinson, and Mr. J. H. Palmer.

The directors who go out of office by rotation are Julian Goldsmid, Esq., M.P., Colonel Wilkinson, and Philip Twells, Esq., M.P. The auditor who goes out of office is Joseph Sebag, Esq. These gentlemen are all eligible for re-election, and offer themselves accordingly.

The CHAIRMAN: Gentlemen, it has been the practice for many years for the chairman at these meetings to make a few remarks, in the first place upon the report which has been read, and in the next place upon the events which have occurred affecting the interests of the association since the date up to which the report is made. Of course, you will all remember that the report carries us up only to the 31st of December of last year, and that in a company like this, with important interests and many important stations, events are constantly occurring which naturally are of interest to the shareholders, although they cannot properly be incorporated in a report which only embraces the period of six months ending on the 31st of December previous to the meeting. On the last occasion when I had the honour to preside at this meeting, I had to announce that, owing to illness, our esteemed chairman, Mr. Twells, was not able to be present. To-day I have again to apologize for his absence, which happily does not arise through illness, but from the fact that he is away in the country at the marriage of an old friend. For that reason I am here to occupy the chair. On the last occasion I had also to refer to the sudden death of our friend Mr. Attwood; an event which had occurred only two or three days before we had the honour to meet you. I have again to mention a loss which our ranks have sustained in the death, a few weeks ago, of Mr. Wilkin, who for many years anxiously and zealously attended to his duties as a director of this association. The vacancy at the board caused by the death of Mr. Palmer last year was not filled up at the time, but after a great deal of deliberation and careful consideration, looking at the varied interests which have to be represented, looking also to the power of service which might be given by the gentlemen in question, the board have in the first place elected Mr. Francis Bassett, late M.P. for Bedfordshire, who for many years has taken an interest in the affairs of the association, to the first vacancy in their numbers; in the next place, they have appointed Colonel Josiah Wilkinson, a gentleman of considerable experience at the bar and in public life, whose varied knowledge they thought might be useful to them; and finally, they have elected the son of our former director, Mr. John Horsley Palmer, a

young man who, I venture to say, has both time and ability to devote to the service of the association; and we trust that the three gentlemen so elected will be a valuable acquisition to our numbers. Now, gentlemen, to refer more immediately to the subjects of interest connected with our business, as mentioned in the report. Last year I had to present to you a most gloomy picture of the state of our trade, because of the results and effect of the very high price of coal, and of other articles required in the conduct of our undertaking. Now we are reaping the benefit of the heavy fall which has occurred in the markets; so much so that our profits have returned to about the normal standard, and we have, to our great satisfaction, to recommend you to declare a dividend at the rate of £2 per share, as we have done in many previous half years. Now coal, of course, is the most necessary and important element in our manufacture, and I ventured last December to explain some few facts connected with that article of our commerce. The statement made in the report to-day of a fall of more than 3s. a ton in the coal which we have used during the half year now under consideration explains the different results in the working of the past and previous half years, and the only other point upon this head which I would venture to remark upon is that, to our regret, we find that the secondary products have still rather a falling than a rising tendency. It is not many years since we obtained something like 73 per cent. of the price of our coal by the sale of our secondary products, whereas, with all our efforts during the last half year, we have been only able to realize 60 per cent., and I am afraid, as I said, that upon the whole this is rather a falling than a rising quantity. The only other observation I would make upon this general head is this, that every year the more our interests are expanded by the growth of the cities which we supply with gas, the more do the responsibilities connected with the management of the coal department and the secondary products department become heavier and heavier. Of course the inventions of science cause very much disturbance in the state of the markets, and it has been always the endeavour of the board, in arranging for the sale of the secondary products, not to make too long contracts, in order that, if science should discover new means of utilizing them, we should not be behindhand in securing the benefits of those discoveries. That benefit has been reaped at last in the sale of one of our residual articles—viz., ammoniacal liquor. Reference has been made in the report to several of our stations. You know that for some time past there has been a continuous and somewhat unpleasant state of relations between this association and the authorities of Haarlem. Our late agent, Mr. T. Beets, endeavoured to make a contract with the authorities which should be satisfactory both to them and to the board. He was unsuccessful in his object, and after the town had decided that they would not go on with the negotiation, he suddenly died. We then appointed a new agent, a gentleman who has shown by his ability and energy that he thoroughly deserves the confidence of the association. He renewed the negotiations, under the direction of Mr. Drory, with the authorities at Haarlem, and since the date of the close of this report, a contract has been signed between the authorities of that town and ourselves, which, I believe, will be satisfactory to both sides. With regard to Cologne, I stated at the last meeting that we had not yet settled the final questions between the town and ourselves; but within a very few days of the last meeting, a proposal was made by the town to us, which appeared on the whole reasonable, and which we accepted; and the balance finally due to us, in consequence of that arrangement, was almost immediately paid. That question is now, therefore, entirely settled, and I am happy to say that the prospects of the subsidiary station at Ehrenfeld, in the suburbs, are improving, and we hope before long that it will grow into a satisfactory business. There is only one other station with regard to which anything need be said—except Vienna—and that is Bordeaux. You will remember all the circumstances which I detailed last year with regard to the competition at Bordeaux. They are referred to in the report, and I will only say now as I said on the last occasion, that the "Société Financière" of Paris—being a finance and not a gas company—possessed a courage which gas companies do not possess, and have taken a contract for the lighting of that town which can only result in a loss to themselves, and which cannot be satisfactory to the authorities. We, however, are safe, because that society must pay over to us the value of the works which belong to us there, and though their contract must be bad for them, we know exactly what our position is. No gas company would venture to compete on the terms offered by the municipality, and therefore the "Société Financière" easily obtained the concession—a concession which, as I said before, must prove disastrous to them. With regard to Vienna, the statements made in the report carry you up to the end of last year. As I explained at the last meeting, the position of things at Vienna was exceedingly difficult and troublesome. There were a number of contending parties in the Town Council; some of whom wanted one thing and some another, so that practically, as far as we were concerned, the result was extremely embarrassing. According to the arrangements of the Municipal Council, it was resolved that a public competition should be held on the 15th of January last. Under advice which we received, and from information furnished to us by our *employés*, agents, and engineers there, we thought it very advisable that some members of the board should proceed to Vienna, to be there to see what steps it might be necessary to take. Accordingly my colleague, Mr. Henry Wood, accompanied me to Vienna in the month of January. We stayed there some time, and made additional offers and had many interviews with the burgomaster and the Gas Committee; but the result of our visit was, that we saw the council had not arrived at that state of unanimity necessary to enable them to conclude a contract. We therefore departed with regret, without having accomplished the object we had in view. After that time negotiations continued almost daily, and we had constant correspondence, and there were constant interviews between our representatives and those of the town. The "Société Financière," the company to which I have already alluded, appeared as the only tenderers for the public lighting upon the conditions published by the municipality. They went on day after day making offers to secure the contract, and they did it with the obvious intention—an intention which they themselves avowed—that they would not carry on the lighting themselves, but meant to issue shares and found a company, in order to put a premium into their own pockets; and, whatever the result of the contract might be, they would leave the company to get on with it as best they could, but would make sure of their own profit on the transaction. That may be good finance business, but I venture to think it is bad gas business. We certainly did not think it right to go on the principle of a Dutch auction till we had reduced the profits to nothing, and the aspect of affairs became most serious to them and to us. At the same time, we should have had an advantage which they never had—viz., that we had, as we have all along contended, and which I believe those who oppose us pretty well know, the perpetual right of supplying the private lighting, even though we did not make any fresh contract for the public lighting. So things went on, and, if the "Société Financière" had obtained the contract, we should have competed with them in the city for the private lighting. Three weeks ago, however, we received a most pressing invitation to go over and see whether some fresh arrangement could not be arrived at. Up to that time the Gas Committee had been sitting, and they had prepared a contract with the "Société Financière," which they were prepared to present to the council. Acting on the invitation, Mr. Wood, Mr. Newton, and Colonel Wilkinson accompanied me to Vienna to see what could be done. Mr. Newton did not stay the whole time, but the other three members of the board did; Mr. Wilkinson and myself only arrived at home last night, and Mr. Wood will not arrive until to-night. I will not take you through all the proceedings at Vienna, but I may tell you that our conferences with the burgomaster and Town Council, consisting of some of the acutest men in Vienna, were long and harassing. The result, however, was that on Saturday last a contract was signed between us and the town of Vienna, which, though not so good as we could wish, was the best that under the circumstances could be made, and though not so satisfactory as many contracts made in former years, is satisfactory at least in this respect—that though our profits will be small, our agents and engineers will be left at liberty to give their full energies and time to the development of the business of the association, now that the long agitation of the past four years has been brought to a conclusion there. We did our best in the interests of the association, and we can now only hope that our prospects may be improved by the arrangements which have been made. We left Vienna on Saturday night, after having signed the contract, which is to be submitted to-day for ratification to the Town Council itself. We are advised that the burgomaster and committee were empowered by the council to conclude the contract with us, subject to the confirmation of the council, and we are informed that they have a considerable majority in the council who will adopt anything those gentlemen have thought it right to accept. There is, therefore, no moral doubt that that contract will be ratified between five and seven o'clock this evening, and that to-morrow we shall receive a telegram announcing the event. As far, therefore, as this negotiation is concerned, all that remains is to say that we are glad it has come to an end, so that for the future our officers may devote the whole of their time to the real business of their departments.

A SHAREHOLDER: How long is the contract for?

The CHAIRMAN: It depends upon a variety of clauses. We have agreed for a term of 22 years, at the end of which time the town, on giving us notice, are to have the right of purchasing our property at a valuation, and there are powers under which they may terminate the contract at the end of 12 years, without purchasing the works, when we should, of course, still be able to continue the private lighting. I had better not go into further particulars, however, but ask you to show that confidence in us in reference to this matter that you have always shown on previous occasions. I think I have now taken you through the most interesting topics in the report, and of what has since occurred, and therefore all I have to say in addition is, that we have experienced in the last half year, as we have always hitherto experienced, the most hearty support and the most active assistance on the part of our general manager, Mr. Drory, and our engineers, agents, and officers, in the promotion of the interests of the association. They have given all their time and ability to do the best in our service, and I believe the satisfactory results we are able to report to-day are to a great extent owing to the exertions they have made. I did not think it right to sit down without having mentioned this fact, which the directors regard with much gratification. Gentlemen, this being the state of our affairs, it now only remains for me to move—"That the report upon the affairs of the association, which has been read, be received and entered on the minutes;" and in so doing I would say that if there are any questions which, in fairness to the business of the association, and having regard to that reticence which I have before pointed out as sometimes necessary I can answer, I shall be most happy to do so.

Mr. JOHN RICHARDSON seconded the motion.

A SHAREHOLDER: You stated that during the half year ending December, 1874, there was a reduction in the price of coals of 3s. per ton. May I ask what are the prospects as to price at the present time?

The CHAIRMAN: There has been a slight decline, but we do not think that coals will ever go back to the prices at which they were five years ago. Of course, the moment there is a rise in the iron trade, which has been in a very low condition, there will be a rise in coals also, but we cannot speak with confidence on this point.

The motion was then put and carried.

The CHAIRMAN moved—"That a dividend of £2 per share on the 56,000 shares of the association be declared for the half year ending the 31st of December last, and that the same be payable, free of income-tax, on and after the 15th of June next, as recommended in the report."

Mr. SARSON seconded the motion, which was put and carried.

Sir MOSES MONTEFIORE: I rise with great pleasure to propose that Mr. Julian Goldsmid, M.P., be re-elected a director of the association. I am sure, after what you have heard from him to-day you cannot doubt that you have in him one who is most willing and able to serve this association, and to devote his time to our interests. He has proved this to you by his readiness to take a journey to Vienna in the very depth of winter—a journey which I certainly should not much envy him—that he might be in a position, if possible, to negotiate a most important contract for us. Gentlemen, I am a very old man, and you must make some allowance for my infirmities. I have been your president for now half a century, and it has been a great satisfaction to me to see the association flourishing. I trust, under the direction of the gentlemen I see around me, it will continue to increase in prosperity. I am sure you will vote unanimously in requesting Mr. Goldsmid to continue his services on the board.

Mr. NEWTON seconded the motion, which was put and carried.

The CHAIRMAN acknowledged the vote, and proposed the re-election of Colonel Wilkinson, which was seconded by Sir MOSES MONTEFIORE, and carried.

The re-election of Mr. Twells as a director, and of Mr. Sebag as an auditor, followed, and on the motion of Mr. RICHARDSON a vote of thanks was passed to the chairman and directors.

The CHAIRMAN: Gentlemen, we are much obliged to you for this vote. I now beg to move, as I have gladly done on former occasions, that the hearty thanks of the meeting be presented to Mr. Drory, and to the engineers and officers of this association, for their services in the past half year.

Sir MOSES MONTEFIORE seconded the motion, which was put and carried and the proceedings terminated.

GEORGETOWN (BRITISH GUIANA) GAS COMPANY, LIMITED.

The Half-Yearly Meeting of Shareholders was held at the Offices of the Company, 60, Cornhill, London, on Tuesday, May 25—THOS. HUGHES, Esq., Q.C., in the chair.

The SECRETARY (Mr. A. Lass) having read the notice of meeting, the seal was affixed to the register, and the following report and statements of account presented:—

The directors have much pleasure in submitting to the shareholders the accounts of the company for the half year ending the 31st day of December, 1874.

These, with the annexed report of the engineer, show the progress of the company.

The directors have to state that the profit for the half year has amounted to £866 8s. 0½d. and that, after bringing forward the balance from the last account, and paying the dividend to the 30th day of June, 1874, together with the interest on loans to the 31st of December, 1874, there remains an available balance of £559 9s. 1½d., out of which the directors recommend the declaration of a dividend for the half year ending the 31st day of December last, at the rate of 4 per cent. per annum.

The large reduction in the price of gas, to large consumers, has been in operation during the whole of the present half year, and notwithstanding this there has been a considerable increase in the gas-rental.

In consequence of the increased consumption of gas it has become necessary to erect additional retorts, gasholder, and plant.

The directors retiring by rotation are John Drysdale, Adolphus W. Perot, and Robert Pate Drysdale, who, being eligible for re-election, offer themselves accordingly.

The retiring auditor is Robert Ring, who, being eligible for re-election, offers himself accordingly.

The dividend will be payable on the 1st day of July next.

ENGINEER'S REPORT.

Gentlemen,—The stock returns, statements of accounts, &c., for the half year ending Dec. 31, 1874, will, I trust, be found correct, and that the half year's working may be deemed satisfactory by the directors.

The price per ton of coal in the retorts has been nearly the same as for the corresponding period of last year.

The Trinidad bitumen continues a valuable agent in enhancing the illuminating power of the gas, no further supply of bitumen having been imported, the price per ton remains the same as for the corresponding six months of last year.

The consumption of gas is steadily and satisfactorily increasing; the gas-rental for the half year ending Dec. 31, 1874, showing an increase of 4499.22 dols. over the corresponding period of last year, or 51.6 per cent., or taking the private consumption alone, an increase of 1,397,000 cubic feet, or 128 per cent. Owing to the large supply of firewood here just now, the coke sales have not been so satisfactory, realizing only 181.52 dols. more than for the corresponding half year of 1873, while the sale of tar realized 92.32 dols. more than for the corresponding half year of 1873.

The only additional charges for the capital account have been the extension of the 3-inch main in the Brick Dam Road, and the proportionate charges for new services, and some slight extension of buildings.

The whole of the buildings and plant are in a most efficient state of repair; the gasholder continues to work satisfactorily, and that, together with all ironwork above ground, have frequent coats of tar to preserve them from rust.

Everything is well in the purifying department.

The engineer's bi-monthly reports, together with the monthly carbonizing statements, keep the board fully informed as to the working in the manufacture and distribution departments.

The fitting department has been kept well employed during the half year. Thirty houses have been fitted with 341 lights, additional lights number 105; public lamps 5, together 451 lights for the half year, and one cooking stove.

In conclusion I would beg to congratulate the board on the favourable rates at which the last two cargoes of coal were obtained, and would add that if our future requirements can be obtained at the same (or if possible lower) rates it will go far to verify the concluding paragraph contained in my last half-yearly report, viz. :—"That should the price of coal be materially and permanently reduced, the future prosperity of the company may be relied on."

Dr. *Balance-Sheet, Dec.* 31, 1874. *Cr.*

Share capital—				Fixed plant, mains, and		
2846 shrs., at £5, fully paid up	£14,230	0	0	services, as per last account	£28,910	4 10½
3354 shares, at £4, called up	13,416	0	0	Add since expended	269	16 1½
Debenture bonds	6,300	0	0	Stock in hand	3,631	0 10½
Retort renewal-fund account	58	5	11	Cash at bank, and in hand	1,027	9 3
Bills payable	1,272	13	0	Amounts owing by sundry		
Amounts owing to sundry persons	1,021	14	2½	persons	3,019	11 1½
Profit and loss account—net revenue	550	9	1½			
	£36,858	2	3		£36,858	2 3

Revenue Account, Dec. 31, 1874.

Coals and bitumen	£1,214	13	6	Gas, rental of meters, products, fittings, and sundries	£3,529	7 3½
Purifying account	25	4	4			
Wages account	374	16	9			
Repairs and maintenance of works and plant, &c.	112	6	6			
Salaries	637	10	0			
Rent, rates, and taxes	77	2	6			
Directors and auditors fees	155	5	0			
Trade and general charges	62	10	11			
Bad debts and allowances	3	0	9			
Balance, carried to profit and loss—net revenue	866	8	0½			
	£3,529	7	3½		£3,529	7 3½

The CHAIRMAN: Gentlemen, I think from a persual of the report you will see that though we do not proceed by leaps and bounds in our progress, yet that progress is very steady and satisfactory. If shareholders have kept their last balance-sheet, they will see that the profit made in the last half year exceeds that made in the previous half by a very considerable sum indeed. In the previous half year the profits were £545, whereas the sum which we have earned during the past half year is £866. That advance is obviously a very large one; and what is so satisfactory just at this crisis is, that it has been made in spite of a considerable reduction in the price of gas, which, as the shareholders had notice, it was in the contemplation of the board to make This reduction was made to all consumers burning above 1500 cubic feet per month. The present advance in our profits has been earned in the face of this large reduction of price. At the same time, the policy of this reduction—that it was a step in the right direction—is perfectly evident by the fact that, notwithstanding, there has been a considerable increase in the total rental. The alteration, therefore, was clearly not only politic, as regards our relations with the town, but as a matter of finance also. I do not know that there is anything more for me to say. The shareholders have the report of the engineer in their hands, which goes in some detail into the working of the company, and from which they will learn a confirmation of the satisfactory state of things which the board have reason to believe exists at Georgetown. With respect to the consumption of gas they will see there has been a gratifying increase. That increase in the half year amounted to 4499 dols. over the corresponding period of 1873, or 51·6 per cent., or, taking the private consumption alone, an increase of 128 per cent. Then the engineer gives some details as to the state of the works, the satisfactory condition of which the board have reason to believe has not been overstated. There will be a necessity before long to make some additions, but that is a matter for future consideration. I now move the adoption of the report.

Mr. H. P. STEPHENSON: I second the motion. As the chairman has told you, the increase in the gas-rental is very satisfactory. But to my mind the working is not so satisfactory as it ought to have been, and I hope when we have another gasholder up, and additional retorts in operation, the working will give a better result, both as regards the gas sold per ton and the amount of fuel used for heating the retorts.

The motion was put and carried.

On the motion of the CHAIRMAN, it was resolved—"That a dividend for the half year ending Dec. 31, 1874, be declared at the rate of 4 per cent. per annum, free of income-tax, and that the same be payable on the 1st of July."

On the motion of Mr. ALFRED WILLIAMS, the retiring directors were re-elected; and on the motion of Mr. BLYTH, the retiring auditor was re-elected.

Mr. R. KING moved a vote of thanks to the chairman and directors, to the secretary, and to the local committee in Georgetown.

The vote was agreed to, and the CHAIRMAN having acknowledged the same, the proceedings termimated.

NICTHEROY (BRAZIL) GAS COMPANY, LIMITED.

The Seventh Annual General Meeting of this Company was held at the Offices, Great Winchester Street, London, on Tuesday, the 25th of May—Mr. C. PENNELL in the chair.

The SECRETARY (Mr. W. W. Wright) read the advertisement convening the meeting, which was originally called for the 10th of May, but a quorum not being present at that time, it was adjourned till the following day with the same result, when an adjournment to this day took place.

The following report was presented:—

The directors, in presenting to the shareholders the annexed statement of accounts for the year 1874, have the satisfaction to report more favourably upon the business of the company. Economy has been effected in several items of expenditure, the total amount remaining nearly the same as for the year 1873, notwithstanding that the revenue has been increased by nearly £3000, and would have been more so, but that a considerable part of the coal carbonized was 1873 stock bought at the extraordinary prices that ruled in that year. The public lights were gradually increased during the year from 809 to 950; and, according to the latest advices, the number has since been raised to 1015. Every effort is also being made to promote the use of gas by the inhabitants; the directors are able to refer to a very considerable increase in this branch of the revenue as compared with previous years. It is now believed that the future of the company will be more prosperous than the past has been. The company have derived considerable benefit, without expense, from the presence of Mr. Gotto in Brazil, who is still there; he has frequently visited the works, and has exercised great care and attention in supervising the establishment, and in seeing that the working is placed upon the most economical and efficient basis.

By the annexed statement of accounts, it will be seen that the profit on the year's working is £2763 8s. 9d., but that sum is reduced, by the loss on the year 1873 and by bad debts, to £2078 6s. 3d., which sum the directors propose to deal with as follows:—To set aside £400 to depreciation account, and out of the balance of £1678 6s. 3d. to declare a dividend of 2 per cent., free of income-tax. This sum the directors would be glad to distribute, but at present they are obliged to use it as working capital, in consequence of the £5000 of 7 per cent. debentures that were offered to the shareholders and to the public out of the £10,000 created not having been taken to the desired extent; £5000, as was mentioned by the directors in their last report, were required to complete the extensions authorized by the Provincial Government, and to provide working capital, but £3000 only were subscribed. Hitherto the company, in order to obtain the means of carrying on the works, and to prevent any interruption of the street lighting, have frequently been obliged to borrow money on the personal guarantee of the directors, who would now be glad to be relieved of that responsibility. They, therefore, now again invite subscriptions for the balance of £2000 of 7 per cent. debentures.

The chairman is the retiring director, and, being eligible, offers himself for re-election.

The auditors, Messrs. Price, Waterhouse, and Co., retire, and offer themselves for re-election.

The usual report of Mr. Neate, the consulting engineer, is not given this year, in consequence of his temporary absence in the north of Brazil; he will, if possible, take an opportunity of visiting the works.

Dr. *Revenue Account, Dec.* 31, 1874. *Cr.*

Coals carbonized	£6,237	5	0	Gas supplied to street-lamps	£9,441	14 8
Purifying materials	20	8	9	Less fines	146	8 0
Carbonizing wages	715	3	4		£9,295	6 8
Yardmen and labourers	404	14	9			
Lamplighters and inspectors	850	5	2	Public buildings	333	17 11
Salaries and commissions	1,106	12	8	Private consumers	2,959	13 10
Agency in Brazil	750	0	0	Residual products	2,053	15 3
Honorarium to concessionaire	250	0	0	Fittings	318	5 0
Maintenance	155	17	7	Transfer fees	0	5 0
Insurance of works	90	0	0	Sundries	1	13 4
Brazilian taxes	45	13	7			
Law expenses	20	11	0			
Directors remuneration	500	0	0			
Office expenses in London and Brazil, including secretary	474	19	3			
General expenses in London and Brazil, including postage and receipt stamps, telegrams, and sundries	251	12	10			
Auditor	15	15	0			
Interest on £3000 of 7 per cent. debentures	210	0	0			
Interest on loans	149	0	0			
Income-tax	5	9	4			
Balance (profit) carried to profit and loss account	2,709	8	9			
	£14,962	17	0		£14,962	17 0

The CHAIRMAN said it would have afforded the directors much pleasure if they could have laid before the shareholders a better bill of fare than was contained in the report now submitted. It was not very satisfactory food for hungry men, he must confess, and yet it held out the promise of better entertainment next time. It was impossible for any company to continue its business and to fulfil its duties satisfactorily with an insufficient working capital, and this company formed no exception to that rule. They could not complain of the treatment the company had received from the Provincial Government of Rio Janeiro. Of necessity, a certain time must elapse before the company could receive payment for the gas consumed by the public lamps, and that time might be assumed to be about four months, while a similar time must pass before the private rental could be collected. The arrears from these two sources represented a sum of nearly £5000, which amount the company must be provided with. Moreover, on account of the great distance from England, it was necessary always to have a stock of coals in hand and on the way, so as to prevent the possibility of any interruption of the public service. To trust to the markets of Rio would be both expensive and inconvenient. It would be seen from the accounts that, in addition to these requirements for working capital, the company held a stock of fittings, which it was necessary to maintain, amounting to upwards of £2000; so that altogether they should be provided with a capital of £10,000, in order to work the concern advantageously. The first number of public lamps contracted for by the company was 535. By the latest advices from Brazil, it appeared that this number had been increased to 1030. Of these, about 250 were required for the lighting of a new district. That district, of course, demanded a special survey, and new mains to be laid down; in fact, it was in a measure a new undertaking, for which a certain amount of money had to be expended. This had been accomplished, and no doubt this district would prove a source of revenue to the company. The directors had been considerably disappointed, in consequence of the slow way in which the private lighting at Nictheroy progressed. As a rule, the private lighting exceeded the public lighting. In Rio it amounted to nearly double, but in Nictheroy it was the reverse. Last year the company received nearly £10,000 from the public street-lamps, whereas the amount received from private consumers was less than £3000. There could hardly be a doubt that eventually the regular order of things would prevail; it was a matter of time and patience; and when it did, the company would begin to pay dividends of 8 or 9 per cent., and perhaps more. The company had hitherto been embarrassed to a certain degree by the want of working capital, and he hoped the shareholders would see the necessity for putting an end to that unsatisfactory condition. It could hardly be desired by them that such a state of things should continue, and the directors naturally wished to be relieved from being habitually responsible, personally, for the debts of the company. One member of the board, Mr. Gotto, had been several times to Brazil, and on each occasion had taken the opportunity of visiting the Nictheroy station. Latterly, he had bestowed much time and attention upon it, so as to bring it into perfect order and to promote economy there, so far as compatible with efficiency of operations. It would be difficult to find a person more fitted for such a purpose than Mr. Gotto. If the shareholders would look over the accounts, they would see some of the results of his labours. Last year the working expenses were rather less than in the previous year, and yet the revenue increased by nearly £3000. He (the chairman) did not attribute the whole of this to Mr. Gotto, but he thought that gentleman was fairly entitled to the credit of a considerable portion, and that the company, in consequence, owed him a debt of gratitude. Mr. Neate, the company's consulting engineer, was absent for a time in the north of Brazil, and he would, if possible, visit the works before his return, and make a report to the board thereon. In reviewing the history of the past, and looking at the present condition of the company, he (the chairman) felt the strongest encouragement for believing that a new era was opening upon the concern, and that, in future, its operations would be carried on with more success than hitherto. With these remarks, he moved the adoption of the report.

Mr. MICHOLLS, in seconding the motion, said the directors had endeavoured to increase the working capital by asking for a further amount of debentures to the extent of £5000. Of this only £3000 was taken up, and they had, therefore, been obliged to use the money which should have been divided as profit in providing gas-pipes, and for other requirements of the company. The directors, as stated in the report, had frequently been obliged to raise money for the com-

pany on their own responsibility, and it was to be hoped that in the future the same necessity would not arise.

A SHAREHOLDER asked whether some representation might not be made to the Provincial Government, with a view to obtain a mitigation of the enormous fines imposed upon the company.

The CHAIRMAN said it had been a matter of serious consideration with the board, and he himself had written a letter to the Government on the subject, which he hoped would be attended to. At the same time, the company might be considered fortunate, when contrasted with the Bahia Company in this respect.

The motion was put and carried.

The CHAIRMAN said the company, by its contract with the Government, was required within certain limits, to extend the works whenever called upon to do so. To meet this demand, the directors had offered to the shareholders and the public debentures at 7 per cent., only £3000 worth of which had been taken up. He was rather surprised at this, because the security was undoubtedly good. If the company stopped there would be upwards of £10,000 immediately available, besides the land upon which the works were erected, the machinery, &c., which had cost upwards of £70,000. It was difficult, indeed, to see what other security could be required. The directors failing to raise the money required were obliged to supplement the £3000 by taking the profits for the last year, and they were therefore unable on this occasion to recommend any dividend. He was sorry for the circumstance, but he believed the necessity would not arise again. He had now to move—"That in consequence of sufficient funds not being available, and it being necessary to employ the profits in the extensions ordered by the Government, and in working capital, no dividend be declared."

Mr. MARTINEAU seconded the motion, which was put and carried.

The retiring director and the auditors were re-elected, and the sum of £21 was voted to the latter for their past services.

A vote of thanks was given to the chairman and the directors, which having been acknowledged, the proceedings closed.

CHRISTCHURCH (NEW ZEALAND) GAS, COAL, & COKE COMPANY, LIMITED.

The Annual General Meeting of this Company was held on March 1—Mr. W. H. LANE in the chair.

The SECRETARY (Mr. C. W. Bishop) read the directors report, which was as follows:—

The shareholders will be glad to learn that the operations of the company during the year 1874 have produced a satisfactory result, aided greatly by the laying of the new mains referred to in the previous year's report, and the consequent addition to the number of gas consumers.

Your directors, in order to induce a very much larger consumption of gas, and to give more general satisfaction to the consumers, have reduced the price thereof to thirteen and fourpence (13s. 4d.) per 1000 feet cash.

Important alterations and improvements are being carried out at the company's works, rendered necessary by the rapidly increasing business of the company.

The usual statement of the company's accounts is attached to this report, showing a sum of £4190 10s. 7d. profit upon the year's transactions; the sum of £1557 10s. *ad interim* dividend has been paid, and, with the balance from last year, leaves the sum of £2677 4s. 5d. for appropriation.

Your directors recommend that £1780 be paid in dividend, £813 7s. 3d. be placed to depreciation and reserve fund, £83 16s. 10d. be carried forward, making a total of £2677 4s. 5d.

Dr. *Revenue Account, for the Year* 1874. *Cr.*

Stock of coal and purifying material, Jan. 1	£1,055	12	9	Revenue derived from—			
Subsequent purchases of ditto	4,263	2	11	Sale of gas and rent of meters	£8,706	5	6
	£5,318	15	8	Sale of coke, tar, and sundries	1,794	17	7
Stock on hand, Dec. 31	1,996	14	10	Certificate and transfer fees	56	10	6
Cost of coal carbonized and purifying material used	3,322	0	10	Sale of gas-stoves	102	9	1
Gas-stoves and heating apparatus—viz.:							
Stock on hand, Dec. 31. £39 16 6							
Subsequent importations 157 5 2							
	£197	1	8				
Stock on hand, Dec. 31	118	3	4				
	78	18	4				
Wages at the works, and lamplighting	1,188	14	2				
Salaries, fees, and directors allowance	858	12	10				
Rent, taxes, and insurance	98	6	4				
Tools, materials, and repairs	178	2	11				
Stationery, advertising, & printing	43	8	0				
Miscellaneous	183	1	5				
Discount and interest account	490	11	3				
Bad debts marked off	27	16	0				
Balance to profit and loss, from working account	4,166	19	10				
Ditto, and from sale of stoves	23	10	9				
	£10,660	2	8		£10,660	2	8

The CHAIRMAN said the accounts spoke for themselves, and gave prospect of such a return as all the shareholders would, he felt sure, be thoroughly satisfied with. If any shareholder wished to ask any questions, he would be happy to answer them. If not, he would ask some shareholder to move the adoption of the report and balance-sheet.

Mr. E. C. J. STEVENS moved the adoption of the report and balance-sheet. He felt sure that all would be thoroughly satisfied with the state of the company.

Mr. COWLISHAW seconded the motion, which was agreed to.

The retiring directors, Messrs. Lane and Gould, and the retiring auditors, Messrs. Alport and Walton, were re-elected.

Mr. BLAKISTON moved—"That a dividend be declared as recommended by the directors."

Mr. JOSEPH GOULD seconded the resolution, which was carried.

Mr. MONEY wished to ask why there was such a large sum as £1188 14s. 2d. for wages at the works and lamplighting.

The SECRETARY explained that it was necessary to keep the retorts going night and day, and, therefore, there was a great deal of work to be done. The amounts spoken of by Mr. Money were included in the weekly pay-sheets which came before the directors every week.

Mr. MONEY was perfectly satisfied with the answer, and only wished it to be generally known.

A motion was then adopted raising the remuneration of the chairman to £50 per annum.

Mr. STEVENS asked whether the directors had considered the advisableness of investing the depreciation and reserve fund, so as to return interest instead of remaining in the company. He thought the present was a very favourable opportunity for investing money, and it therefore occurred to him to ask whether the directors had thought over the matter of investing this amount.

The CHAIRMAN said that they had advertised this money, but were unable to get security they could accept at 7 per cent. They, therefore, thought that it would be better to lend the money to themselves, and they had consequently arranged to leave over 8 per cent. interest for this, which was better than they could get when they offered the money. If, however, the directors saw their way to invest the money at a more favourable rate they would do so.

The meeting terminated with a vote of thanks to the chairman.

[This report reached us per the ill-fated *Schiller*, the condition of the MS showing that the mail bag which contained it had been for many hours under water.—ED. J. G. L.]

WEST OF SCOTLAND ASSOCIATION OF GAS MANAGERS.

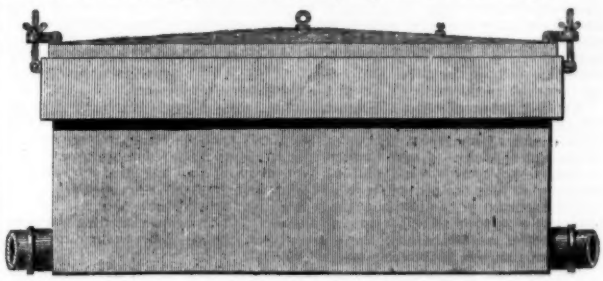
(*Continued from page* 770.)

The SECRETARY read the following paper by Mr. Hall (Hexham), on

A NEW AND SIMPLE METHOD OF FIXING PURIFIER-COVERS.

I have great pleasure in sending you my paper, accompanied by a model, on a new and simple method of fixing purifier-covers. My proposal may not be considered of any special value, nor of much importance to the more talented of the profession, yet I think it may prove to be of some interest to the members of the association generally, for whom it is meant. Remembering the original basis of the association—that it was designed to afford opportunities for bringing forward whatever might be considered to be improvements in the manufacture of gas, and in the working apparatus employed therein—I am sure you will overlook any defects in this contribution, and believe in my willingness to assist in the advancement of our common object. The arrangements for fixing purifier-covers are numerous, and without doubt many of them very cumbersome, such as the long clasp folding over, the long double-knee, clutching purifier and cover together, and the double-kneed binder, with screw on one end. Each of these principles more or less works to some disadvantage.

The method this day represented suits the purpose better than anything I have ever tried for its simplicity, neatness, and strength; it is easily worked, and fits the cover in any position that it may be placed in the lowering of it.



The arrangement consists of two ears or snugs rivetted or screwed on the side of the purifier as near to the edge of the pocket as possible, so as to allow sufficient strength and prevent them from breaking away. Connected to these snugs, with bolt and forelock, is a $\frac{5}{8}$-inch screwed bolt, fitted with thumbscrew or nut of sufficient length, passing up through an oblong hole in brake or lever on end. The brake or lever also is of sufficient length to enter into a groove or snug rivetted on the top edge of the purifier-cover, the groove measuring 3 inches horizontally, and 2 inches deep, the end of brake or lever connecting in groove with $\frac{5}{8}$ or $\frac{1}{2}$ inch bolt, having the full control in binding down cover with thumbscrew or nut. On removing the last-mentioned bolt, which is the only part of the apparatus that requires to be displaced, except the easing of thumbscrew, all folds back on a universal joint in the place it is fixed, returning it back in the same way when required. Either the binding or releasing of the cover is only the work of one minute's time if properly fitted together.

I beg also to introduce to you a pipe-key or wrench, the merits of which are that it is simple, light, powerful, and easily worked. It is made in the form of a Y at both ends, it needs no shifting to suit different sizes, it is made to work $\frac{3}{4}$-inch down to $\frac{3}{8}$-inch iron tube. I have every confidence in bringing it under the notice of the association for its power and simplicity. When once you gain your hold, you may break pipe or key before it gives way. In some instances I have had to use the hammer to release the key from the pipe. I may not be the first to introduce it, but up to the time of my first using it here I had never seen it. I trust you will give it a thorough test.

Mr. M'GILCHRIST, in moving a vote of thanks to Mr. Hall for his paper, observed that he saw no great advantage to be derived from the appliance described. It would take more expense to fit it up for a large purifier than by means of the principle in use at the present day.

Mr. MONK seconded the vote of thanks, remarking that their association was understood at first to be the infant school of gas managers, and it was their duty to give every one encouragement, and be mutually helpful to one another by interchange of opinions.

The motion was cordially passed.

Mr. YOUNG (Clippens, Paisley) then read the following paper on

THE CONDENSATION OF CRUDE GASES.

At our last meeting, held at Musselburgh, I had the honour and pleasure of laying before you a paper, compiled from notes left in my hands by the late Mr. Cuiter, on the absorption of the light-giving constituents in coal gas by the heavy hydrocarbon oils.

You will remember that, in the discussion which followed the reading of the paper, Mr. Key, of Accrington, remarked that, since hearing of the action of the heavy oils on the illuminants in coal gas, the idea had suggested itself to him that our preconceived notions of the best form and manner of condensing the crude gases were faulty, as he thought that ordinary coal tar had in all probability an action similar to that of the heavy oils, and he then asked the writer's opinion on the subject.

I expressed my regret that I could not at the time reply to Mr. Key's query, in consequence of the matter being the subject of a patent then in process, the property of Mr. Henry Aitken, of Falkirk; but as that patent is now completed, and I am therefore at liberty to reply, I have made it the subject of the paper which I propose laying before you to-day.

Briefly to recapitulate the subject of the previous paper, I may remind you that it discussed the solvent or absorbent action of the heavy oils on the illuminants in coal gases; the separation of the absorbed illuminants from the heavy oils by distillation; the examination of their physical character (specific gravity, boiling points, &c.); and the analysis of coal gases by means of the heavy oils, showing that they are principally indebted for their illuminating power to vapours of volatile hydrocarbons diffused through them.

The process which I am about to lay before you has for its object the treatment of crude coal gases in such a manner as to leave diffused through them as large a volume of these vapours as possible, consistent with their permanency.

You are aware that coal tar, on being subject to distillation, yields a considerable quantity of volatile hydrocarbons, known as light naphtha. This quantity varies from 2 to 10 per cent. of the total volume of the tar, being dependent upon the nature of the coal and the temperature at which it has been carbonized. At all ordinary temperatures coal gas, when brought into intimate contact with this isolated naphtha, takes up a considerable quantity of its vapour, and becomes thereby much improved in illuminating power. Every grain of naphtha vapour taken up by a cubic foot of 12-candle gas increases its luminosity to the extent of from 5 to 10 per cent. A consideration

of these facts naturally suggests the question—Seeing that gas can at all ordinary temperatures permanently combine with the vapour of this naphtha derived from the tar, what prevented the gas and naphtha from keeping together during the process of manufacture, and what caused the naphtha vapours to be removed along with the tars?

With the view of obtaining a clearer insight into the causes producing these effects, and the means for their prevention, I propose to make a few experiments bearing on the causes affecting the diffusion of the vapours of volatile substances through gas.

I have here three ordinary bromine-tubes, only that, instead of being graduated from the bottom upwards, they are graduated from the top of the stem downwards. Into each tube I have introduced 100 volumes of air. I have here also three samples of hydrocarbon fluids taken from coal gas in the process described in the former paper. The fluids vary in boiling point, No. 1 boiling about 120°, No. 2 about 150°, and No. 3 about 180° Fahr. Into one of the tubes, containing the 100 measures of air, I will now pass a few drops of the hydrocarbon boiling at 180° Fahr., and agitate the whole so as to present a large surface to the air. On bringing the tube into a vertical position, and removing my finger, you will observe water to flow out of the tube, and that the air has considerably increased in volume. (I note the increase to be 5 volumes.) I will now repeat the same process with the other tube, and the hydrocarbon boiling at 150°, and you will observe that the volume of air is in this case increased to a much greater extent. (I note the increase to be 15 volumes.) With this other hydrocarbon boiling at 120°, I have an increase of the air enclosed in the third tube of 40 volumes.

I need hardly say that this increase of volume is caused by the vapour of the hydrocarbon diffusing itself through the enclosed air. (I have used air for these experiments because it is most convenient; but the results would have been identically the same with any other gas, as the medium through which any volatile substance is diffused has no effect on the volume so diffused, a vacuum and all gases being alike in this respect.) You will see from these experiments that the volume of vapour diffusible through a given quantity of air increases as the boiling point of the hydrocarbon is lowered.

Another cause affecting the volume of vapour diffusible through gas is the temperature to which they may be exposed. I will take this tube containing the air and hydrocarbon, boiling at 180°, and slightly raise the temperature by passing it backward and forward over the lamp flame. On bringing it into a vertical position, you will observe how much it has increased in volume, much more than the heated air would have done by itself, showing that at the slight increase of temperature there is a very considerable increase of the quantity of vapour diffusible through the air; and on again returning the tube to the water jar, and cooling the enclosed air, it deposits the extra volume of hydrocarbons, and acquires its original volume.

Barometrical pressure, or the pressure of the atmosphere, also affects the volume of vapour diffusible through a given volume of gas. It has been already stated that a vacuum and all gases take up almost the same volume of vapour of volatile substances. To illustrate the effects of pressure, I will therefore employ this ordinary barometer tube, into the top of which I will introduce a few drops of this volatile hydrocarbon. You will see how quickly the mercury is depressed in consequence of the vapour from the liquid diffusing itself through the vacuum. I will now shorten the column of mercury by slipping the barometer tube into this other tube, also filled with mercury, and you will observe that as the pressure is increased by shortening the column of mercury, the vapours condense; and on again lessening the pressure, the liquid at once evaporates again into the vacuum. In a similar manner a given volume of gas saturated with vapour, on being subjected to an increase of atmospheric pressure, becomes reduced in volume, and being no longer able to hold in solution the whole quantity of vapour, deposits a certain quantity, which on the pressure being removed, is again taken up by the expanded gas.

There is only one other condition affecting the diffusion of volatile substances through gases to which I desire to draw your attention, but I wish to do so very particularly, as it is this which principally affects the diffusion of hydrocarbons in coal gas during the process of manufacture. I will again ask your attention to the test-tube containing the air saturated with the vapour of the hydrocarbon boiling at 120° Fahr. Into this tube I will introduce a little of the hydrocarbon boiling at 180°, and shake the whole together. You will now observe that, on removing my finger under water, the volume is considerably reduced, and that, instead of having 140 volumes of mixed air and hydrocarbon vapour, as before, we have got only 115, showing that 25 volumes of vapour have been condensed into the liquid form. If I add a further quantity of the heavier fluid, a further condensation takes place, and the total volume of mixed air and vapour is still further reduced. I will now reverse the process by taking the tube containing the air saturated with the denser hydrocarbon boiling at 180°, and, adding a little of the more volatile fluid boiling at 120°, proceed as before; and, on removing my finger, you will observe that the volume is now much increased, the total volume being 125. But this increase is not nearly so great as that got in the previous experiment, when the hydrocarbon boiling at 120° was used alone; for you will remember that the total volume was then 140 instead of 125, as in this case. By adding a further quantity of the lighter fluid, the volume is further increased, but not to the extent it would be were the denser fluid not present.

It is evident, therefore, that the pressure of the denser fluid boiling at 180° very much reduces the vapour-tension, or volatility of the lighter hydrocarbon, boiling at 120°. In further evidence of this, I will now use this hydrocarbon having a very high boiling point, when you will observe that, on adding it to the tube containing the air saturated with the vapour from the hydrocarbon boiling at 150°, the whole of the vapour, or very nearly the whole, is absorbed and condensed, and the enclosed air is brought back to its original volume of 100 measures, showing that, the greater the difference between the boiling-points of the different hydrocarbons, the greater is the reduction of the volatility or vapour-tension of the more volatile fluid. So great, indeed, is the solvent action of this heavy hydrocarbon oil, that hydrocarbons which are permanently gaseous at all ordinary temperatures may be reduced to the liquid form. I have here a tube containing olefiant gas, which requires a very great pressure to reduce it to the liquid form; yet you see how readily it is absorbed and condensed when brought into contact with this oil. But this solvent action or affinity between the hydrocarbons is limited, or, in other words, one hydrocarbon can dissolve another in a given quantity, and then the action ceases. The following table, taken from the previous paper, shows the increase of volume of certain hydrocarbons, after being saturated with hydrocarbons from coal gas:—

Name of Oil.	Specific Gravity.	Initial Quantity. Fluid oz.	After Saturation. Fluid oz.	Increase per Gallon. Fluid oz.	Increase per Cent.
Once-run oil . . .	810°	20	22·5	20·0	12·5
Burning oil . . .	820°	20	22·7	21·6	13·5
Heavy oil	840°	20	23·0	24·0	15·0
Lubricating oil . .	860°	20	23·5	28·0	17·5
Blue oil	895°	20	23·8	30·4	19·0
Olive oil	914°	20	23·8	30·4	19·0

On applying heat to such a mixture of hydrocarbons having different boiling points, the solvent action or affinity between the fluids is gradually overcome, and as the temperature increases the more volatile of the fluids successively evaporate. I will slightly warm the mixed hydrocarbons, boiling at 120° and 180°, contained in this bromine-tube, by holding it over the gas-flame, and I will now shake up the whole so as to expose a larger surface to the air, when you will at once observe how much it increases in volume, partly from the expansion of the air itself, but much more so from the evaporation of the lighter of the mixed fluids. On again placing the tube in the water-jar, and cooling the whole, you will observe that the heavier hydrocarbon again absorbs the vapour of the lighter, liberated from it by the heat, and that the enclosed air and vapour resume their initial volume. But if, instead of allowing the air and mixed hydrocarbons to cool together, I transfer into a separate vessel the air saturated with the vapour of the lighter hydrocarbon, liberated by the heat from the mixed fluids, and thereby prevent the heavier hydrocarbon from coming into contact with and reabsorbing the lighter, the air will remain, saturated with the vapours from the more volatile fluid. I have here a flask, into which I will place a little of each of the hydrocarbons boiling respectively at 120° and 180° Fahr. I will slightly heat the enclosed mixture, and having passed a current of air through it, I will now collect in this bromine-tube 140 volumes of the saturated air (which, as you will remember, was the volume obtained by saturating 100 measures of air with the vapours of the hydrocarbon boiling at 120°). If, therefore, the heat applied to the mixed liquids has overcome the affinity between them, the air which I have received in this bromine-tube should contain a like quantity (40 measures) of vapour. To ascertain this, I will absorb out the vapour from the air by shaking it up with a quantity of this very heavy hydrocarbon. You will observe how rapidly the vapours are absorbed, and on bringing the tube to rest on the jar, I note the decrease in volume to be fully what we had anticipated—viz., 40 measures. The temperature necessary to overcome this affinity between the hydrocarbons is very considerable, especially when the volume of the heavier or high boiling point hydrocarbon is proportionately large, and the surrounding air or gas near the point of saturation. On the other hand, a very slight increase of temperature will cause the volatilization of the lighter hydrocarbon, when the volume of the heavier is proportionately small, and the air or gas not nearly saturated.

We have seen that the isolated hydrocarbons have the power of dissolving out the vapours diffused through ordinary coal gas. I now wish to show you how ordinary coal tar, under certain conditions, has a similar property. I have here a couple of tubes. No. 1 is filled with sawdust saturated with ordinary tar, but from which the light naphtha has been previously removed by distillation; No. 2 is filled with sawdust saturated with the same tar in its normal condition (I have used sawdust in these experiments to present as large a surface of the tars as possible to the gas, which I propose bringing into contact with it.) On occasions like this it is difficult to show slight differences in the illuminating power of a gas; but I hope to be able, by means of this delicate pressure-gauge, and the two union-jets arranged side by side, so that you may be able to compare the sizes of the flames, and also the single jet with scale attached, by which the length of the flame may be measured, to show you the effects of the tars upon the gas. You will observe that the union-jets are so placed that one of them is constantly consuming the gas in its normal condition, and that the other may be made to consume the gas either in its normal condition or after it has been acted upon by the tars in the tubes. I will first pass the gas to all the jets, and you will observe that in its normal condition the two union-jets are very nearly alike in size, and that the single-jet gives, with 10-10ths pressure, a 5-inch flame. I will now pass the gas through No. 1 tube, containing the denuded tar spread over the surface of the sawdust. You will see how the flames of the union and single jets consuming this gas are diminished in size (the jet flame being now, under similar pressure, only 4·6 inches long), indicating that the gas, in its passage, is being robbed of some of its illuminating constituents by the tar. I have found this decrease of illuminating power to amount, in many cases, to 20 per cent. On now changing the current of gases, and passing it through No. 2 tube, containing the tar in its ordinary condition, you will observe that the gas undergoes little, if any, change, and that the tars have comparatively little action, in consequence of being already saturated with the light hydrocarbons from the gas along with which it was originally manufactured. I will now apply heat to this tube, with the view of causing the tar to give off to the passing gas the previously absorbed hydrocarbons; the result being, as you see, to increase the size of the flames, showing a very considerable increase in the illuminating power of the gas; the single jet now giving a 5·8-inch flame.

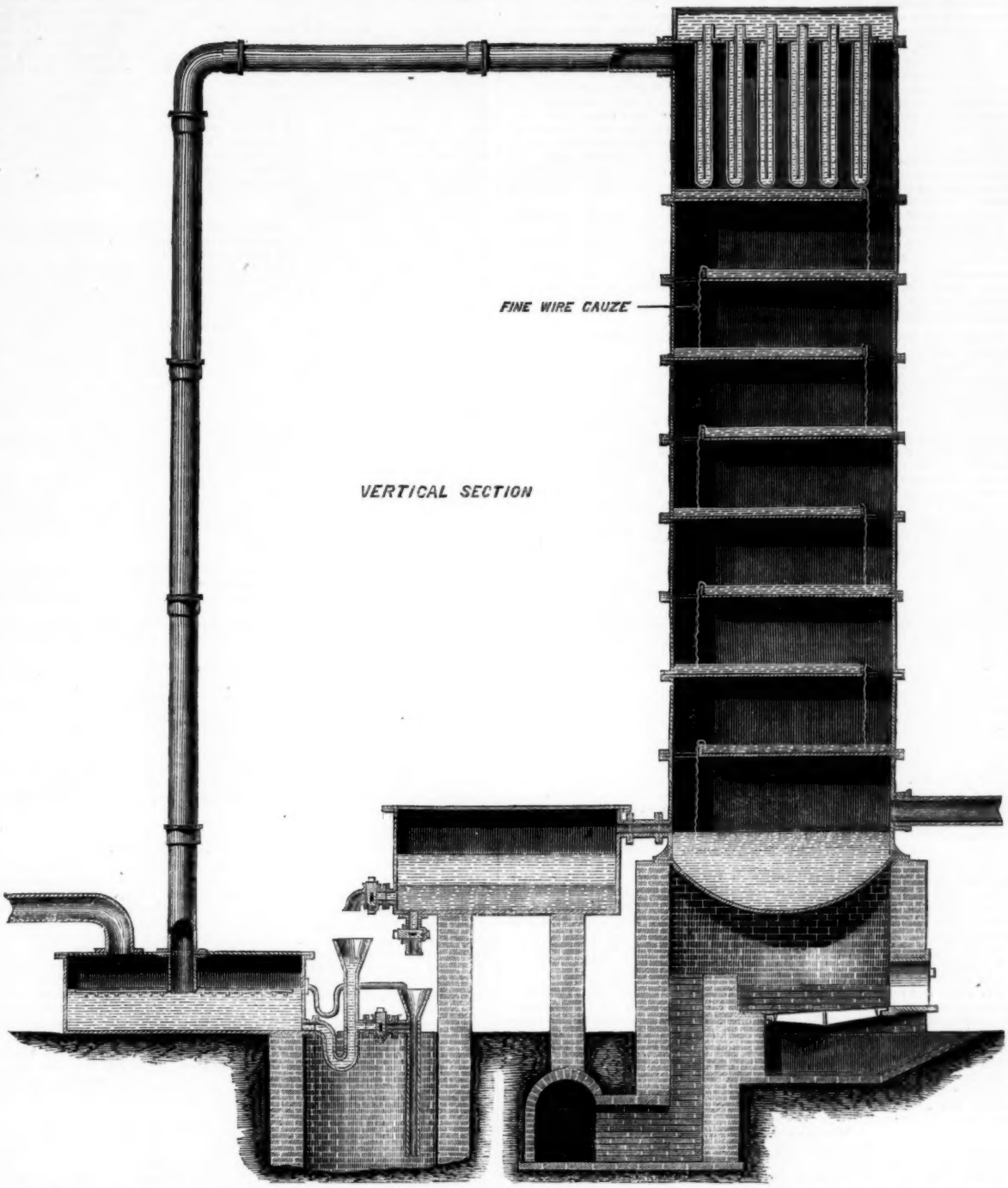
In making these experiments, no attempt has been made to give exact quantitative results, the aim being rather to convey to your minds a general outline of the causes which affect the diffusion of vapours through gases, more particularly with the object of enabling you to understand the working of the new process.

Keeping in view the facts gleaned from these experiments, let us now examine the conditions under which crude coal gases are ordinarily condensed, and see if we can account for the presence in the tars of hydrocarbons, which, when isolated, can be permanently diffused through the gas at all ordinary temperatures. Crude coal gases, immediately on being produced, pass from the retort by the stand-pipe to the hydraulic main, and become rapidly cooled to a temperature ranging from 100° to 150° Fahr. At this temperature the greater portion of the tars are reduced to the liquid form, but are in such a minutely divided form, that they continue to float along with the gas, and in a great measure pass with it to the condensers, and before they are finally deposited, the temperature of the mixed gas and tar particles is reduced to nearly that of the surrounding atmosphere. It has also hitherto been the aim of gas managers to keep even the deposited tar and ammoniacal liquor travelling in the same direction along with the gas, with the object of allowing the weak ammoniacal liquor from the hydraulic main to absorb a further quantity of ammonia, &c., and at the same time allow the tars to take up naphthaline and objectionable sulphur compounds.

Now, we have seen how the tars, denuded of their naphtha, absorb the illuminants of the gas, and as the affinity or absorbent action of the tars is almost entirely arrested at 100° Fahr. (the lowest temperature likely to be present in the hydraulic main), we may, at this stage of the manufacture, suppose the finely-divided tars suspended in the crude gases to be in the denuded form. But, as these tars accompany the gases to the condensers and become cooled, they gradually saturate themselves with hydrocarbons from the crude gases before they are finally deposited and removed. The practice of allowing the deposited tars and ammoniacal liquor to accompany the crude gases till comparatively cold is, for the same reason, objectionable, as the same conditions which would enable ammoniacal water to absorb a further quantity of ammonia, and the tars to absorb naphthaline, carbon bisulphate, &c., would also enable the tars to absorb volatile hydrocarbons from the gas.

We, therefore, see how, by the ordinary process of manufacture, the tars are allowed to absorb and carry away those hydrocarbons from the gas, and thereby deteriorate its illuminating power; and we come now to consider the means to be employed for preventing the removal by the condensed tars of the light-giving constituents from coal gas.

There are a great many ways of conducting the manufacture of gases whereby this absorbent action may be prevented, and the gases left combined with a larger volume of hydrocarbons, which will remain permanently diffused through them at all ordinary temperatures, but which are at present allowed to pass away with the tar. One of the simplest arrangements consists in elevating the condensers a little above the level of the hydraulic main, and causing all the tars, as they are deposited, to flow back into and through the hydraulic main



before passing to the tar cistern. By this means the volatile hydrocarbons absorbed by the tars are partly revolatilized by the heated gases issuing from the dip-pipes, and carried away by the current of heated gases to the condensers, where only the denser vapours are again absorbed and deposited by the now comparatively saturated tars, and the more volatile hydrocarbons passing away permanently diffused through the gas. But the most perfect arrangement, and that preferred by the patentee, is one somewhat resembling that shown on this sectional diagram, which is, however, more particularly designed to illustrate the working of the process in a small work, where steam and motive power are not available. This arrangement is very similar to a Coffey still analyzer, consisting, as you see, of an upright vessel, having tray diaphragms placed at regular intervals, with openings at alternate sides, causing the gas to travel in a tortuous manner. Hanging from the lips of these trays are sheets of fine wire netting, dipping into the tars contained in the trays immediately underneath. The bottom of this analyzing-tower is provided with a tar tank or still, which may be heated either by means of a steam-jacket, where steam is available, or as shown in the sketch, by a furnace, using the refuse breeze as fuel. In order to cool the analyzed gases, on the top of the tower is placed a condenser, which may be of any suitable form. That shown in the sketch consists of partition tubes, suspended into a chamber from the bottom of a tank containing water; this water, circulating continuously through these tubes, brings the gas to an equable temperature. In describing the working of this apparatus, I will assume that the whole arrangement has been for some time in operation, that the whole of the trays and the tar tank or still at the bottom have become filled with tar, and that heat has been applied to the still sufficient to cause the tars to give off volatile hydrocarbons. The mixed crude gases and tars from the hydraulic main enter by the inlet-pipe, and in passing over the surface of the heated tars contained in the still, become, so to speak, bathed in a large volume of comparatively volatile vapours, which combining with and supersaturating the heavier suspended tars, cause them to be partly deposited from the gases during their passage through the first screen of wire netting. At the same time the gases receive lighter vapours from the tars flowing over the wire netting from No. 1 tray. The tars contained in No. 1 tray are considerably heated by the vapours from the still underneath, and they in turn give off volatile vapours to the current of gases flowing over them. The total mixed gases and vapours again pass through the wire netting hanging from No. 2 tray, where they deposit their heavier tars, and absorb lighter vapours from the tars flowing over the wire netting from No. 2 tray. The tars in No. 2 tray also get heated, but to a lesser degree, by the warm current of mixed gases and vapours passing underneath it, and they again, in turn, give off their volatile vapours to the current of gases, and receive in turn some of the heavier tars. This double analyzing process is just repeated at each successive tray and wire netting screen, the crude gases getting gradually cooled and depositing their heavier tars, and taking up volatile hydrocarbons, till by the time they reach the top of the arrangement they are comparatively free from all tars having a denuding action, and are in a fit state to be cooled down, by passing through the condensers, to a temperature near that of the surrounding atmosphere, when the heavier or surplus vapours condense out and fall back into the top tray. At the same time, these condensed vapours and tars, in passing downward from tray to tray, and dripping over the wire netting, come into contact with the rising current of crude gases, by which they are alternately revolatilized and condensed, the more volatile remaining permanently suspended, and passing away with the analyzed gas, and the heavier falling from tray to tray till they reach the still at the bottom of the column, when, if not sufficiently volatile to be revolatilized, they pass away with the denuded tars by the pipe to the tar cistern.

The effects of the treatment are to leave diffused through the gases all the hydrocarbons resulting from the distillation of the coal, which are sufficiently volatile to remain permanently diffused through the gas, and at the same time the gases are perfectly denuded of all suspended tarry particles, and brought into a fit state for further treatment. As by this process the ammoniacal liquor is subjected to the same analyzing process as the tars, it is, therefore, not only prevented from absorbing ammonia and other impurities, but it is also denuded of part of the ammonia, &c., which it may have previously absorbed.

It is evident, therefore, that the crude gases must pass from the arrangement charged not only with the valuable volatile hydrocarbons, but also with a comparatively larger quantity of impurities, soluble in water, which are otherwise removed in part, by allowing the crude gases and ammoniacal liquor to cool together as in the ordinary process. The denuded ammoniacal liquor collected from the bottom of the analyzer in the tank, after separating from the denser tars, is found very suitable for removing those impurities, as in consequence of its containing in solution basic and acid hydrocarbons, it has a comparatively feeble, solvent action on the volatile hydrocarbons diffused through the gas, but at the same time has a strong affinity for the ammonia and other impurities soluble in water. The arrangement shown on the diagram for the employment of the denuded water is a simple washer, and is suitable for a small work. Of course, where motive power is available, a series of washers or scrubbers should be employed to get the full advantage of the purifying action of the denuded water.

And now, gentlemen, it only remains for me to thank you for the attention you have given the reading of this paper. I regret to have taken up so much of your time; but the subject is of such a nature that even with the time which you have so kindly granted me, I have only been able to touch the subject very superficially; yet I hope in such a manner as to convey to your minds sufficent to enable you to understand some of the laws affecting the diffusion of vapours through gases, more particularly as bearing on the causes at work during the condensation of crude gases.

Mr. MALAM asked whether in a short time the tarry matters would not become "pitchy."

Mr. YOUNG, in reply, said that as there was a constant current of fresh tars passing into, and denuded tars passing out of the still, he did not think it likely that there would be any deposit. The water present also would keep the tars constantly in motion, and assist in preventing any mechanically suspended sediment from settling to the bottom. He had not had much experience of the working of this special arrangement on a large scale, but he had formed his opinion from a very similar process in the treatment of heavy paraffin oils intended for lubricating purposes, where, in order to remove all volatile oils present, they were run into a still kept sufficiently heated to drive off all those volatile oils, and were again run out and cooled. By this process many thousands of gallons could be run through the still and denuded of their volatile oils, and very little deposit takes place. The heat applied to the still at the bottom of the analyzing apparatus was only sufficient to drive off the light naphthas, not to distil the heavy tars.

On the suggestion of Mr. NELSON,

Mr. JOHN MAYER, F.C.S. (Glasgow), was allowed to put a question. In doing so, he said he wished, in the first instance, to express the great pleasure he felt in listening to the interesting paper by Mr. Young, whom he had known in former years, and whose acquaintance with the particular branch of applied science to which he had given his attention was surpassed by few, if by any, in Scotland, and who was, indeed, in a measure, the leading scientific man in connexion with the special department of destructive distillation. The point upon which he desired to question Mr. Young was with regard to the thick unpourable tar which accumulated. Anthracene, he said, was a new substance derived from coal tar, coming into considerable importance in connexion with the manufacture of a kind of colouring matter differing from the coal tar colours which they had been acquainted with 10 or 15 years ago, and identical with alizarine, a colouring matter which had hitherto been derived from madder root. He wished to know if there was any unusual quantity of anthracene in this thick tar. If so, this method of treating the gases would be of considerable importance in connexion with the new branch of applied science.

Mr. YOUNG, in reply, said that anthracene was one of the products which was most abundant in tars produced at a high temperature, and was only got in the last of the distillation of such tars. By this new process the tars were subjected to no chemical change, but only to a simple distillation to remove the lighter naphthas. Although, therefore, in consequence of the removal of the naphthas, the per centage of anthracene in the total tars would be slightly greater, yet the total quantity of anthracene derived from the tars from a ton of coals would be the same as that got in the ordinary way. No doubt, were it possible to increase the quantity of anthracene in tars, their value would be much enhanced.

Mr. MAYER said he had just one more remark to make. He wished to get Mr. Young's opinion as to whether the quantity of anthracene in the tars would not be greater by Mr. Malam's process, seeing that he used high heats.

Mr. YOUNG, in reply, said that, as he had already stated, anthracene was only present in tars produced at high heats. The tars obtained at low temperatures (as those produced with paraffin oils) contained scarcely a trace of this valuable product. Indeed, lately he had tried, and he knew others had tried, to procure anthracene from those tars, but had completely failed. He had no doubt that Mr. Malam's tar would be rich in anthracene.

On the motion of Mr. NELSON, a vote of thanks was warmly passed to Mr. Young for his excellent paper, and, seeing that the time was so short, the subject was held over till the meeting in September, when it will be fully discussed.

MISCELLANEOUS BUSINESS.

Messrs. M'EWAN (Gourock) and BLACK (Old Kilpatrick) were elected auditors for the ensuing year.

The statement of the accounts for the past twelvemonth showed to the credit of the association a balance of £12 8s., and a balance of £109 in connexion with the benevolent-fund.

Several applications for participation in the benevolent-fund were remitted to the committee, to inquire and appropriate funds for relief of cases under consideration.

It was agreed to hold the next half-yearly meeting of the association in September next at Stirling.

The members afterwards, to the number of 43, dined together in the Victoria Hotel, Mr. Malam presiding; and a large number also took advantage of the permission granted by Mr. Robert Muir, factor on Bonnington estate, to visit the Falls of Clyde.

STAFFORDSHIRE POTTERIES WATER-WORKS COMPANY.

The Annual Meeting of this Company was held at Hanley on Friday, May 21 Mr. J. ALCOCK in the chair.

The directors report was as follows:—

In submitting to you the annual statements of accounts, we have to report a steady increased rental for the year ending March 25, 1875, exceeding that of the previous year by the sum of £1199 15s. 5d. The balance for the year ending March 25, and the previous undivided balance of £1369 9s. 5d. make a total of £6625 8s., out of which your directors recommended that a dividend at the rate of 5 per cent. per annum (free of income-tax) upon the paid-up capital be declared and payable by dividend warrants, to be forwarded to the shareholders on the 25th day of June next. This will absorb the sum of £4340, leaving a surplus of £2285 8s., out of which they propose to place the sum of £1000 to the reserve-fund account, which will then amount (with interest) to £1502 7s. 8d., and to carry forward a balance of £2285 8s. to the next year's account. The pumping stations and other works of the company are in efficient working order. An additional 12-inch service-main has been laid from the Birches Head reservoir to Hanley, which has considerably increased the pressure throughout the district. The boring operations at the Meir have been carried on with considerable success. The results fully prove the advisability of further extension in this locality, as ample pumping power and means of distribution already exist there. Your directors, therefore, think it advisable to confine their attention to this locality for the present.

The CHAIRMAN, in moving the adoption of the report, congratulated the shareholders on the great prosperity of the company. The dividend recommended by the directors was one-half per cent. in excess of that of last year, and he was happy to say that some claims on the part of millowners had been compromised. Altogether they were in much smoother water than they were at that time last year. He also thought it a subject of congratulation that during the severe drought of last summer they were enabled to keep up the supply almost without a single complaint. In that respect the company contrasted most favourably with some other companies. The directors were now turning their attention to increasing the supply, especially at the Meir, where they had already an extra half million gallons of water per day, which had amply compensated for the outlay there. The operations at Cheddleton Park were for the present suspended, as the directors thought it more desirable to pursue their researches at the Meir. They had not lost sight of Cheddleton Park, and would resume operations there as soon as the operations at the Meir had been sufficiently developed.

Mr. J. BILL seconded the motion.

Mr. HOLTOM asked why the works at Cheddleton Park were suspended, as in the report for 1874 a very rosy account of them was given, and there had been an expenditure of something like £5000 upon them.

The CHAIRMAN thought it would be better if the question were not pressed, because there would be some legal difficulties in the matter, which were then under investigation. It would be for the interests of the shareholders that the question should not be pressed. They might rely upon it that the directors would do all they could to carry out the scheme at Cheddleton Park, but at present it was advisable that the question should not be pressed. The works were not abandoned; they were merely suspended for the present. The directors thought it more desirable to make alteration at the Meir, for if they persevered at Cheddleton Park, it would involve the laying of a new main from Wall Grange to Hanley, and therefore it was advisable to see what they could do at the Meir first. A new main to Hanley, and other expenses which would be incurred, would involve an outlay of £25,000 or £30,000.

After some explanations had been given by the engineer (Mr. Harrison) as to the mode in which the work had been carried out at Cheddleton,

The motion for the adoption of the report was put and carried.

Mr. ADAMS moved the declaration of dividend recommended in the report, and said he thought the directors were wise in carrying over to the reserve-fund a larger sum than they had hitherto done. There might be some claims which would swallow up £2000 out of the reserve-fund, but he looked forward to the future dividend being 6 per cent.

Mr. BILL seconded the motion.

Mr. HOLTOM moved, as an amendment, that the dividend be 6 per cent. He pointed out that their revenue had increased something like £2700 a year, and, if they declared a dividend of 6 per cent., there would still be a good reserve-fund.

The CHAIRMAN said that £2000 of the reserve was already condemned to pay the compromise with the millowners, and this would not be shown in the report till it was paid.

Mr. HOLTOM said in that case he would withdraw the amendment. But he should like to know if the claims of the millowners were at end.

The CHAIRMAN said they would be when the money was paid—until something fresh arose. They wanted £500 a year to renew their mains.

The motion was put and carried, and the retiring directors and auditors re-elected. Thanks having been voted to the directors, an extraordinary meeting was held, when the following resolution was adopted:—

"That this meeting hereby empowers the directors to borrow the sum of £5250, or such part of the same as circumstances may require, under the powers given to the company by the Staffordshire Potteries Water-Works Act, 1868, 31 & 32 Vict., cap. 131, sec. 27."

ABERDEEN (CORPORATION) GAS-WORKS.

On the 24th ult., the members of the Aberdeen Town Council paid an official visit to the gas-works at Sandilands, for the purpose of inspecting the additions just completed at a cost of about £16,000. The visitors were received by Mr. Smith, the manager, and conducted over the several departments. The Lord Provost then performed the ceremony of turning on to the town the gas from a large new gasholder, which constitutes the principal feature of the recent additions, and which for the occasion was gaily decorated with flags. The tank is constructed on the telescopic principle, and is the second largest in Scotland. It is 130 feet in diameter, and is capable of containing 600,000 cubic feet of gas, which will about double the storeage. The previous holders consist of two 50,000, two 100,000, and one 420,000 cubic feet, making together accommodation for 720,000 cubic feet. This, with the new gasholder now added, makes a total storeage capacity of 1,320,000 cubic feet. In the retort-house 44 new retorts have been added, making the present available number 164. The retort-house is 122 feet long by 66 feet wide, and the roof consists of one span of finely adjusted ironwork. The quantity of gas which can now be produced daily is 1,150,000 cubic feet, being an increase since the works were taken over of 310,000 cubic feet.

To make the gas now required for the town, about 100 tons of coal are consumed per day in winter, and 20 tons per day during the summer months. Along each side of the retort-house there are large stores for the different qualities of coal, capable of containing about 10,000 tons at one time, and in convenient proximity are the other buildings required in the manufacture of gas. The excavation and building works connected with the gasholder-tank were by no means an easy task, for, the site being very near the sea, the quantity of water that gathered was a continual source of annoyance, and a number of centrifugal pumps had to be kept constantly at work in order to allow the operations to go on. The contractors for the excavating and mason work were Messrs. Pringle and Slessor; for the gasholder, Messrs. Hanna, Donald, and Wilson, Paisley; for the new purifiers, retort-house, roof, &c., Messrs. Abernethy and Co.; for the hydraulic mains, &c., Messrs. J. Garnie, jun., and Co.; fire-brick and clay work, Messrs. Joseph Cowen and Co., Newcastle; for pipes and fittings, Messrs. Blaikie Brothers; and for the slate work, Mr. William Milne. The whole of the works, as stated above, were executed at a cost of about £16,000, and without any extras occurring. They reflect very great credit upon Mr. Smith, the manager, from whose plans and specifications they were executed.

After completing their tour of inspection and ceremony, the company adjourned to one of the large meter-houses, where a banquet of cake and wine was laid out.

The LORD PROVOST, on taking the chair, said that they had all experienced great pleasure in their inspection of the works. The works were now in a very admirable condition, and things were altogether in a very prosperous way. He confessed that he was one who, when it was proposed that the corporation should take the gas into its own hands, felt considerable qualms at that step. He had always thought that corporations clumsily handled manufacturing details and commercial arrangements, but in this case there was no question that the town had done a good thing, and that he was thoroughly mistaken. One reason why he thought they could not expect to derive much advantage from the taking over of this enterprise was that it was held by persons who looked upon its value very much as they would look upon the value of land, and who would expect the uttermost farthing they could obtain as a purchase price. They did obtain a very large price, and when Parliament awarded 10 per cent. annuities, and attached to that a sinking-fund, he was not, he confessed, very much assured of the probability of success; but, under all these circum-

stances, things had turned out very well indeed. The taking over of the gas-works had been a success, and was likely to be of very large advantage to the city of Aberdeen. Since the corporation took the gas into its own hands, the consumption had increased, and the revenue had also increased as well. The revenue, when it was taken over from the old company, was £32,705, while it was now £39,267, with a decrease in the price of gas of 5d. per 1000 cubic feet, the price now being 5s., instead of 5s. 5d., as it was when the transfer was made. This reduction of price was all the more gratifying seeing that there had been a great rise in the cost of coals. The capital laid out on the works was about £140,000 under the gas company, while now it was about £160,000. The ceremony of turning on the gas that day led him to speak of the increased facilities required for its production. The producing powers of the works when transferred in 1871 were 840,000 cubic feet of gas daily, and the storeage capacity 700,000. The greatest daily consumption during the darkest day of winter was 843,000 cubic feet. The number of meters in use at that time was about 19,000. The extension of the works having now been completed, they were capable of producing 1,150,000 cubic feet of gas daily, and the storeage capacity was 1,300,000 cubic feet. The greatest daily consumption during the darkest day last winter was 1,048,000 cubic feet. The number of meters at present in use was about 21,000. No doubt this extension would last for many years—probably as long as any of those now present would live—but there was plenty of room for further extension. Altogether, he thought the community had very much to congratulate itself, with reference to its present position, regarding this necessary of life. There were two things which it seemed advisable for corporations to have control of—these were gas and water, because it was impossible that these two things could be carried on profitably without being strict monopolies; and he therefore thought they did well in having them in their own hands. It was gratifying to know, and he believed it was the fact, that no other town in Scotland—looking at the distance of Aberdeen from the coal districts—had cheaper gas, and he was happy to say that it was also regarded as the best gas in Scotland.

The usual loyal toasts having been duly honoured,

The Lord Provost proposed "Prosperity to the gas-works," remarking that he did not know any official who more than their manager, Mr. Alexander Smith, recommended himself by his conduct to his employers and those who came in contact with him, he coupled the toast with his name.

Mr. Smith, in reply, said that he was very much obliged for the kind way the Lord Provost had referred to his services. It was now a very considerable time since he had become connected with the gas-works—in fact, he had been several years in the employment of the old company, and was transferred with the works when the corporation made the purchase. Many years had not yet elapsed since gas was introduced; it was only 72 years since the first factory was lighted by gas, by an Ayrshire millwright. The name of that man—William Murdoch—should be handed down to posterity as that of one who had bestowed one of the greatest boons upon mankind, and which should be ranked next to the steam-engine. He (Mr. Smith) had had the greatest pleasure in working with the contractors who had carried on the various departments of the works. He did not think that there had ever been one single high word between them.

The remaining toasts were "The Contractors" and "The Chairman of the Gas Committee."

Bailie Esslemont, in replying to the latter, mentioned that while the revenue had increased very considerably, the production had increased in three years from 113 million cubic feet, dating from 1870, to 143 million. They would thus see the importance of obtaining the gas-works at the time they did, as in ten years after the undertaking would have doubled itself; and, although they paid at the time a very high price, it would soon become neutralized, because, as the works had extended so rapidly, they should not feel the effects of the 10 per cent. they had to pay to the annuitants, while they would now have a large portion of the works at the more economical rate of 4 per cent.

The Lord Provost proposed "The Strangers," coupling with the toast the name of ex-Bailie Urquhart, who, in replying, disclaimed for himself the praise bestowed upon him in connexion with the transference and management of the gas-works, and said that it was chiefly due to Mr. Smith in the working department, and to Mr. Gordon, City Chamberlain, in the financial department.

The Lord Provost's health was then cordially drunk, and the company separated.

The workmen were afterwards entertained in a similar way, and under the genial chairmanship of Mr. Smith, pledged "Success to the gas-works and the new extensions."

IRON AND COAL TRADES OF SHEFFIELD, SOUTH YORKSHIRE, AND NORTH DERBYSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There has been a somewhat more cheerful feeling in business circles since the termination of the Whitsuntide holiday, and in many instances a larger quantity of work has been produced. These facts may, of course, be in a certain sense attributable to the moderate accumulation of orders which took place last week, and to the renewed activity of the workmen after a term of idleness; but it appears, in addition to these conditions, that in several departments of the iron trade proper there is a clearly better demand. This slight improvement is to a certain extent stimulated by the reduction in the price of merchant iron (which I reported last week), and by the concessions in the same respect which are without doubt being generally made in the trade in order to secure orders. I hear of large castings being done at a little over—perhaps not that even in certain cases—£6 per ton.

A very good impression has been created by the declaration of a dividend at the rate of 10 per cent. for the year by the directors of Messrs. John Brown and Co., Limited, Sheffield. This is double the amount of last year's dividend, and is an exceedingly gratifying state of affairs for the shareholders, bearing in mind the state of trade and the disasters which have overtaken other concerns.

Pig iron prices are not very firm, in consequence of the great and growing weakness of the Scotch market. The following are the current quotations of Cleveland agents:—No. 1 foundry, 61s.; No. 2 foundry, 59s.; No. 3 foundry, 56s.; No. 4 foundry, 54s. to 55s.; No. 4 forge, grey, 54s.; No. 5 forge, mottled, 53s.; No. 6 forge, white, 51s. to 52s.; refined metal, 74s.; Kentledge, 64s. to 65s.; and cinder, 43s.; all delivered in waggons or f.o.b. Tees.

The Dronfield Local Board, after having held several meetings on the subject of procuring a supply of water for the town and district, have at length decided to instruct Mr. Hawksley to proceed with his scheme.

The coal trade in South Yorkshire and North Derbyshire is still remarkably quiet in many branches, although there have just been several gas coal contracts placed, and a greater tonnage of steam coal is being sent to the Humber for shipment. Next week will probably bring about a further drop in prices, say of 1s. per ton.

IRON AND COAL TRADES OF SOUTH STAFFORDSHIRE AND EAST WORCESTERSHIRE.

(FROM OUR OWN CORRESPONDENT.)

There is no improvement to report in the iron trade of this district, and many of the representatives of the trade now begin to complain sorely of the continued high price of fuel and the increasing difficulties in the labour market. Makers of best branded iron are fairly well engaged, and best bars are still firm at £10 10s. to £11 and £11 12s. 6d. per ton respectively for the three ruling qualities of the market. The demand for best sheets is well sustained, and galvanized roofing sheets continue in good request for India, Australia, and South America, and production in this branch is increasing; in other respects the demand is very languid, and the commoner qualities of merchant iron are weaker, and the competition for the few orders that are in the market is increasing in severity.

Makers of railway spikes in this district are being undersold beyond all hope of remedy by Belgium and France, who are taking orders both for home and foreign railways at the enormous difference of £8 per ton.

The Darlaston Steel and Iron Company, Limited, are now making in considerable quantity a homogeneous metal, in which the leading properties of best iron and steel are combined. The metal has recently been subject to severe testing in the presence of the members of the Admiralty Boiler Committee, with most satisfactory results. At present the material is being principally used in the manufacture of best steam tubes and flanges.

The pig iron market is again weaker, and large quantities continue to be imported from other districts. The nominal quotations are—for cinder pig, £3; medium mixed cinder and mine, £3 17s. 6d.; and for best native all-mine hot air, £5 to £5 5s. per ton.

The demand for pigs for foundry consumption continues steady.

The number of furnaces blowing in the South Staffordshire district remains at 79, but one or two additional ones will be lighted shortly, some of which have recently undergone reconstruction.

The coal trade is inactive; quotations for thick coal on the Dudley side of the district are nominally unchanged, but there is considerable underselling going on amongst the non-associated masters. In the Wolverhampton district prices are weak and irregular, and many of the collieries are only in partial operation. The colliers strikes in Warwickshire and North Staffordshire are spoken of as likely to be protracted. Coke is in somewhat improved demand, and prices are steady, at late rates.

The wages question in the iron trade is again under discussion, and is exciting considerable attention. The agreement under the existing scale terminates next month.

THE COAL AND IRON TRADES OF LANCASHIRE.

(FROM OUR OWN CORRESPONDENT.)

The coal trade of this district continues exceedingly flat, and there has been very little work done by the miners during the week succeeding the holidays, a course of action which has evidently been adopted by the men with the view of preventing any large accumulation of stocks. This partial stoppage of the output at the pits, however, beyond causing temporary inconvenience in a few cases to consumers who had run out of stocks, and found some difficulty in obtaining immediate supplies, does not appear to have at all strengthened the market. The leading colliery proprietors have not altered their list rates, and there is still a disposition to stock rather than make any reduction. The smaller proprietors, however, do not show the same firmness, and common classes of engine fuel, which are difficult to sell, are being offered by them at very low rates.

A very fair number of orders for cannel have been given out in the Manchester market during the last week or so, and one large firm have placed nearly the whole of their this season's supply. The average prices at the pit's mouth are about 20s. to 21s. per ton, but some heavy contracts have been placed at about 19s. per ton. For gas coal, although there is plenty of inquiry, only a moderate amount of business has been done. The average pit quotations for good screened gas coal in the Manchester district are about 14s. per ton; but in the Wigan districts contracts are being placed at about 12s. 6d. per ton at the pit's mouth.

A tolerably steady business has been doing in coke, and prices remain without any material change, large cokes being quoted at 20s., and small ditto at about 12s. per ton at the pit mouth.

The iron trade of this district continues quiet, and both local and other brands of pig iron are weaker in price, Lancashire makes of foundry, delivered in Manchester, being quoted at 68s. 6d., and forge at about 65s. per ton; and Middlesbrough, No. 3 foundry, at 64s. 3d., and forge at 63s. 3d. per ton. Finished iron also is easier, but makers have not altered their standard quotations. There is, however, underselling going on; ordinary bars, delivered in Manchester, are worth about £8 12s. 6d. per ton; angles, £8 15s.; light rails, £7 17s. 6d.; and heavy ditto, £7 12s. 6d. per ton.

THE COAL AND GENERAL TRADE OF THE NORTH OF ENGLAND.

(FROM OUR OWN CORRESPONDENT.)

A pretty steady business was done in coals last week in the northern ports. The shipments of gas coals from the Tyne, especially best quality, were fully on average. Best sorts were quoted at from 10s. 6d. to 11s.; seconds, from 8s. 6d. to 9s. Steam coals showed four days turns for the best sorts at the shipping places, and there was a moderate inquiry for seconds. Household coals have not been very much looked after. Manufacturing coals have been firmer, and there continues to be a good demand for coke.

With regard to shipping and the freight market, on account of the bad home business from the Baltic, outward rates thence have been firmer, and more money has to be paid to small vessels to load coals for the Scandinavian ports. The coasting coal trade is extremely dull, and little business is doing for the north of France. Mediterranean outward rates are also lower. There are good shipments of coke from the Tyne.

The general manufacturing trade of the North of England is firmer. More business was done in pig and manufactured iron last week, and the tone of the iron market in Cleveland was very much improved. There has been a steady inquiry for chemicals. The advance of the previous week has been fully maintained. Shipments continue to be satisfactory, and prices are firm. The fire-clay goods trade of the Tyne is doing very well at present. Several of the leading houses are pretty full of orders.

TRADE NOTES FROM SCOTLAND.

(FROM OUR OWN CORRESPONDENT.)

Almost every week brings one or more announcements of reductions in the price of gas. This week brings two. The directors of the Motherwell Gas Company have resolved to reduce the price of their gas 10d. per 1000 cubic feet, the reduction to come into operation on the 31st of May. The other instance in point is that of the Denny Gas Consumers Company, the reduction being 1s. 3d. per 1000 cubic feet, and counting from the 1st day of May. At present the price stands at 7s. 6d. per 1000 feet. It has not yet been publicly announced, but I am given to understand that a reduction in price has also been resolved on by the Gas Committee of the Dundee Town Council. I believe the reduction is to be from 5s. 8d. to 5s. per 1000 cubic feet.

A considerable amount of interest has been excited by Sir Windham Anstruther's Gas Supply Bill, especially among the gas companies of large towns in Scotland. The directors of some of those companies had actually got alarmed at certain things which seemed to be looming in the distance, and accordingly a deputation was sent to London, by whom opposition was threatened to the progress of the bill. It now turns out, however, that the bill will not be opposed. The omission of a compensation clause was a pure oversight on the part of the promoters, and an arrangement has been come to whereby existing gas companies that would be affected by the creation of new works will have their vested interests protected. Sir Windham Anstruther was willing to give effect to this necessary requirement as soon as its omission was pointed out,

consequent upon the operation of the bill upon places already possessing gas-works, but which places were not contemplated in the drafting of the measure. It is intended that where existing works would be interfered with, the burgh authorities shall first purchase the same upon an average valuation of the last preceding five years—the fair value to be determined by arbitration in case of dispute.

At the last meeting of the Cupar Town Council, the subject of the Gas Supply Bill was under consideration. The provost thought the time would come when every town would be compelled to acquire the gas-works, and he had no doubt it would be advantageous for them to do so. He, therefore, recommended that a petition should be presented in favour of the bill, which was unanimously complied with.

The annual meeting of the gaslight company of Newburgh, Fifeshire, was recently held, at which it was stated that the yield of gas per ton of coals during the past year was less by upwards of 1000 cubic feet than the average of the eight preceding years. The profits of the company are, in consequence, much reduced, and the waste prevents the directors declaring the dividend which the shareholders expected. The lower price of coals, however, holds out better prospects for the ensuing year.

A preliminary meeting of the directors of the Kirkcaldy Gas Company was held on the evening of Friday week with reference to a proposal by the promoters of the scheme for the extension of the burgh boundaries to include the gas-works in the new bill. No definite understanding was arrived at, but the shareholders are to meet on an early day to consider the matter.

Mr. William Fairweather, lately manager of the Dunoon Gas-Works, has been appointed to a similar position under the Barrhead Gas Company. I have just learned also that Mr. John Macrae, son of Mr. B. Macrae, the well-known manager of the Corporation Gas-Works, Dundee, has been appointed manager of the Bury St. Edmund's Gas-Works. There were 95 applicants for the situation. The manager-elect has hitherto been acting as assistant to his father, and is a very promising young man.

At the last meeting of the Perth Corporation Gas Commissioners—Lord Provost M'Donald presiding—it was agreed, in terms of the recommendation of a committee, to purchase 2000 tons of Clydesdale coal, at 13s. 6d. per ton; 250 tons each of Lumphinnans and Dunnikier, both in Fifeshire, the former at 11s. 6d., and the latter at 16s. 6d.; and not more than 1500 tons of first-class coals. The latter was remitted to the Works Committee to settle the contracts from among the offers received.

Arbroath Gas Corporation Annuities must certainly be very valuable property. One, of £11 4s., was recently sold in two lots at £32 12s. each; and another of £5 12s. was sold at £35 15s.

The Local Authority of Beith Parish (Ayrshire) are now evidently determined to push on with their new water-works. Plans of the proposed works have been designed by Mr. W. R. Copland, C.E., Glasgow, and advertisements are now out, asking for tenders for the construction of a reservoir, filter, and tank, and the laying of about 3000 yards of fire-clay pipes, and about four miles of cast-iron pipes. Messrs. R. B. Bell and D. Miller, C.E., Glasgow, have also in hand a water-works scheme for Grangemouth, and tenders are requested by the Burgh Commissioners for the laying and jointing of 8920 yards or thereby of cast-iron pipes and incidental works. Estimates are also wanted for the execution of the Aberfeldy Water-Works.

It was reported at the last meeting of the Greenock Water Trustees that the quantity of water in store in the various reservoirs was 395 millions of cubic feet, being equal to 112 days supply for all purposes. At the same meeting four sealed tenders from ironfounders, for the supply of cast-iron pipes required by the trust, were submitted, and it was agreed to accept the offer of Messrs. Robert MacLaren and Co., Eglinton Foundry, Glasgow.

The Police Commissioners of Crieff have again had their unfortunate water-track from Loch Turret under consideration. Mr. Young, C.E., submitted a report, stating that to cement and otherwise repair the present pipes would cost about £100; that to put down new 9-inch fire-clay pipes would cost about £336; and that to lay with cast-iron pipes the expense would be about £812. But, on his recommendation, the commissioners agreed not to adopt any of the plans until a more thorough inspection of the track had been made.

The water question has at last made a step forward at Galashiels. At a meeting of the local authority lately held, it was resolved, on the recommendation of the Water Committee, to adopt the scheme proposed by Mr. Leslie, C.E, Edinburgh.

There is now no fear of any parliamentary contest over the Kilmarnock Water Company's bill, a compromise having been agreed upon between the company and the Parliamentary Bills Committee of the Town Council on certain points that were in dispute between those two bodies.

An improvement has been reported in the finished iron trade of Lanarkshire, several rolling-mills having been set to work that had been 15 or 18 months at rest, but the pig iron trade is very flat. The price for pig iron warrants was down as low as 60s. 9d. per ton last Thursday, and on Friday prices were a shade lower.

The coal market is still depressed in Lanarkshire, with business very sluggish, and coalmasters pressing sales to keep the pits going. Prices have given way again, and, notwithstanding that some pits have been shut up, the supplies continue large. Wishaw Main coal is quoted at 7s. 6d. to 8s. per ton.; house coal at 8s. 3d. to 10s. 6d.; splint coal at 8s. 6d. to 9s.; steam coal at 9s. to 11s.; and smithy coal at 14s. 6d. There is rather more activity on the East coast, but prices are tending downwards there also.

Market Bosworth Gas Company.—This company has just been formed, with a capital of £2000, in 400 shares of £5 each, most of which are taken up. It is expected that the works will be completed by the end of September, and the town lighted in October next. The engineer for the works is Mr. John Surl, Hinckley, the gentleman to whom the erection of new gas-works at Hinckley was recently entrusted; the contractors for the building are Messrs. Langton and Son, of Enderby; and for the ironwork and fittings, Mr. R. Dempster, of Elland.

Testimonial to Mr. Henry Woodall.—At a meeting of the directors of the Burslem and Tunstall Gas Company, on Friday last, it was resolved—"That the directors do place upon the minutes their high appreciation of the merits of the company's manager, and regret at the loss of his valuable services. The directors think it only just to place upon record the fact that, during Mr. Woodall's management, great extensions have been made to the company's plant, which have made the works of the Burslem and Tunstall Gas Company one of the most complete and economical in working in England. Mr. Woodall has shown himself equal to the mastery of many difficulties, some of a serious character, with which the company has had to contend." At a subsequent meeting of the shareholders of the company on the same day, the above resolution (which was accompanied by a gift of £100 as "compensation for loss through the high price of coal") was read by the chairman, and it was further resolved—"That the shareholders desire to recognize the action which the directors have taken in placing on record their sense of the value of their late manager's services. The shareholders desire the directors to appropriate a sum of £50 towards the purchase of some object for presentation, and to mark their regret at his withdrawal from the management. They hope that success may attend him in the new responsibility which he has undertaken under the Corporation of Leeds." A few days before the above meetings, Mr. Woodall was presented with a handsome timepiece and a gold pencil-case by the workmen.

Pollution of Rivers Bill.—A public conference was held at the Society of Arts on Monday, May 24, under the auspices of the Fisheries Preservation Society, for the purpose of considering the provisions of the Government Bill for preventing the pollution of rives. The Duke of Northumberland presided. Sir R. Torrens, M.P., moved—"That this meeting, while cordially welcoming the introduction by Her Majesty's Government of a measure dealing with the pollution of rivers, is of opinion that, with certain important amendments, the bill introduced into the House of Lords will be of considerable assistance in purifying the rivers of the country." Lord Powerscourt seconded the motion, but desired to see the bill extended to Ireland. Mr. W. P. Maxwell characterized the bill as a "Manufacturers Protection Bill." He disagreed with the idea that county courts would be the best tribunals, and urged that as local magistrates were always acquainted with the localities, they would form the more satisfactory and equally inexpensive court. Professor Williams Bund looked upon the bill as a retrograde measure, inasmuch as it did not propose to keep all solids out of the river. Some discussion followed, in the course of which a strong opinion was expressed in favour of a strict definition of the word "pollution" being introduced into the bill, and it was suggested that there should be a classification of rivers from which water should be drawn for domestic purposes. A committee was appointed to watch the progress of the bill through Parliament, and to take such steps as may be necessary to secure the insertion of the requisite amendments.

Leeds Water Supply.—Accident at the Arthington Pumping-Works.—A special meeting of the Water-Works Committee of the Leeds Town Council was held on Thursday last, in consequence of a serious accident to the large Cornish engine at the Arthington Pumping-Works. The water-works engineer, Mr. Filliter, C.E., stated that soon after four o'clock on Wednesday morning the engine, which had been working all night at its usual speed, suddenly made what is technically called its "outdoor" stroke by a violent drop, instead of by the usual easy descent. This was immediately followed by an explosive eruption of water from the main-pump, which blew up two of the stone landings of the working floor, and deluged the house. Before the engineman on duty could succeed in shutting off the steam, two more violent strokes were made. Subsequent examination showed that the suction and delivery valve boxes of the main-pump, the first pipes of the large rising main, and the main sluice-cock were split, that the cylinder cover was broken to pieces, and the cylinder jacket cracked. It is hoped that no further damage of importance has been done; but the examination is still proceeding. Messrs. Whitham, of the Perseverance Iron-Works, were immediately called in, and their manager (Mr. Walker) states that, under the most favourable aspect of the case, it must take four or five weeks to make the necessary repairs. Should any mishap occur in making the castings, a longer time will necessarily be required. The committee state that the water stored in the Eccup reservoir (which is about 140 million gallons), added to what the other engines at Arthington can pump, will enable them to give a full supply for about four weeks only. They have, therefore, determined to shut off the water at night from six p.m. to six a.m., and thus, as they hope, save enough water to enable them to continue the supply for the daytime until the repairs are finished. The committee also resolved that street watering should be discontinued until further notice, and that the inhabitants should be requested not to water gardens or use the water in any unnecessary manner.—*Leeds Mercury.*

Foreign Shipments of Gas and Water Pipes, Gas Coals, &c., from Scotch Ports.—The following shipments have recently been reported:—To China—cast-iron pipes, 24 tons 15 cwts. 2 lbs., £157; fire-bricks, 172 tons, £147. To San Francisco—fire-bricks, 216 tons, £197; another lot, 637 tons, £543. To Bordeaux—pitch, 60 tons, £90. To the Mediterranean—malleable iron tubes, 11 tons 2 cwts., £250; another lot, 18 tons 9 cwts., £490; cast-iron pipes, 52 tons 7 cwts. 25 lbs., £387. To Demerara—cast-iron pipes and bends, 38 tons 17 cwts. 19 lbs., £284. To Antwerp—malleable iron tubes, 9 tons 8 cwts., £165. To New York—fire-clay pipes, 48 tons, £95; fire-clay pipes and rings, 27 tons, £45; another lot, 14 tons 10 cwts., £23. To Melbourne—malleable iron tubes, 4 tons 9¾ cwts. 7 lbs., £116; another lot, 88 cwts., £75; cast-iron pipes, 77 tons 8½ cwts. 14 lbs., £507; gas-fittings, £29. To Dantzic—coal tar, 900 barrels, £540. To St. John's, Newfoundland—gas coal, 248 tons, £480; coal tar, £4. To Brest—fire-bricks, 8 tons, £10. To Surinam—products from coal, £16. To Rangoon—fire-bricks, 24¾ tons, £100; products from coal, £8; lamps, £65. To Santos—cast-iron pipes, 29 tons 8¼ cwts. 14 lbs., £205; fire-bricks, 6 tons, £5. To Rotterdam—fire-clay pipes, £67; another lot, 270 cwts. To Flensburg—coal tar, 263 barrels. To Riga—fire-bricks, 170 tons. To Quebec and Montreal—malleable iron tubes, 3 tons 11 cwts., £75; another lot, 9 tons 9 cwts., £165; cast-iron pipes, 96 tons 1½ cwts. 26 lbs., £742; another lot, 27 tons 19¼ cwts. 7 lbs., £197; fire-clay pipes and branches, 10 tons 16 cwts., £50; another lot, 16 tons 12 cwts., £38; and a lot of 74 tons, £143. To Seville—fire-bricks, 39 tons, £60; cast-iron pipes, 78 tons 18¼ cwts. 18 lbs., £518. To Tobago—fire-bricks, 20 tons, £23. To Barcelona—gas coal, 509 tons, £643. To St. Petersburg—fire-bricks, 190 tons. To Callao—gas coal, 862 tons, £1508. To Rio de Janeiro—cast-iron pipes, 55 tons 5¼ cwts. 18 lbs., £400. To Havana—iron retorts, £237; gas coal, 630 tons, £622. To Trinidad—fire-bricks, £105.

The Drainage of Towns on the Thames.—A Local Government Board inquiry was held on Wednesday, at Abingdon, before Mr. Thornhill Harrison, C.E., one of the inspectors of the board, in answer to an application from the Corporation of Abingdon for powers to purchase land compulsorily for a sewage farm. It is intended at Abingdon to carry out a scheme of Mr. J. Bailey Denton's for disposal of the sewage by intermittent downward filtration, combined with irrigation. Mr. Leach, engineer to the Thames Conservancy Board, was one of the witnesses, and was asked by Mr. Harrison, to tell him what had been done by the various towns on the Thames towards diverting the sewage from the river. Mr. Leach said that a vast number of notices had been served upon local authorities and upon individuals, requiring them to discontinue discharging sewage into the Thames, and in looking over that list it was astonishing to see the number of cases in which the requirements of the conservators had been met, though in some cases only temporarily by stopping the mains, and running the sewage into cesspools, a system which the inspector described as dangerous to the water supply of towns which had adopted that system, Staines being one that had come under his notice. Mr. Leach stated that this process had been adopted at Wallingford, Henley, Marlow, Egham, and Staines. At Lechlade none of the sewage now goes into the Thames direct; at Oxford an extensive sewage scheme is being carried out; at Reading a gigantic scheme is finished, but no pumping has been done yet; at Maidenhead the sewage is put upon the land; at Windsor, which was the worst town on the Thames, and had drained all its sewage into the river, a drainage scheme is now begun; at Slough there were some offensive closet drains which have been removed; and at Chertsey the communication of the drains with the river has been almost entirely cut off. Mr. Leach said he had observed beneficial results from the diversion of the sewage in the condition of the water. There were now no offensive drains emptying into the river, with the exception of the towns where the works had not been completed.

Appledore (Devon) Gas Company.—This company was formed in September last, with a capital of £2000, in 400 shares of £5 each; and a competent board of directors was appointed, with the Rev. Edward Reynolds (vicar) as chairman. Last Wednesday the new gas-works, which have been in construction since November last, were opened, and the day will long be remembered as one of the gayest Appledore has ever experienced. From different houses in the streets streamers and flags were suspended; and at the entrance of West Appledore was a small and neat triumphal arch, surmounted by an illuminated gas star, on one side of the arch being the words, "Let there be light," and on the other "Lighten

our darkness." Over the post office were the initial gas letters "V. R.," and at the entrance of the works was another arch, with words of welcome upon it. At five o'clock the opening proceedings commenced by the ascension of a large gas balloon, bearing the names of the contractors (Messrs. Vickary and Robertson, of Exeter), the engineers (Messrs. Ramsay and Co., of Hull), the builders (Messrs. Bowden and Co., Appledore), and the secretary (Mr. George Baker). Immediately succeeding this another balloon, the shape of a salmon, 14 feet long, was let up, and also an ordinary balloon. In a field at Watertown, where the works are situated, about 400 of the inhabitants assembled at six o'clock, and partook of tea in a tent erected for the purpose, afterwards indulging in various innocent games. In the same field was a tent in which a public dinner was held at the same time, to which about 90 sat down, under the chairmanship of the vicar. After the dinner, a very creditable display of fireworks was exhibited, most of which were made on the premises of the contractors at Exeter. The band of the Bideford Rifle Corps attended the festivities, and tended much by their performances to increase the general feeling of hilarity. It appears that the total capital expended on the undertaking is £2038 9s. 10d. It is, however, intended to extend the works to the village of Northam, and for this purpose the number of shares has been increased to 550. The extra cost will be £696 3s. 4d., making a grand total of £2735 13s. 2d.

PRESENTATION TO MR. JAMES JOWETT.—The *employés* of the Leeds Corporation Gas Department met on the evening of Friday, the 28th ult., to make a presentation to Mr. James Jowett, the manager of the Meadow Lane Gas-Works, who, after 30 years connexion with gas matters in Leeds, has been appointed engineer of the Grimsby Gas-Works. The testimonial consists of a handsome marble and bronze timepiece, supplied by the well-known local establishment of Mr. J. W. Bell, and bears the following inscription:—"Presented to James Jowett, Esq., by a number of his friends connected with the Leeds Corporation Gas Department, as a token of their regard, upon his appointment as engineer of the Grimsby Gas-Works." The presentation was made by Mr. Jabez Hill, one of the oldest servants in the department, who, after expressing his deep sense of the honour conferred upon him, and the great personal pleasure he had in being selected to perform this duty, commented upon the fact of Mr. Jowett possessing the universal esteem of the department, and though regretting his departure, wished him every success in his new sphere of duties. His remarks were ably seconded by Mr. Carter, foreman of the gas stokers, and Mr. Jowett, in acknowledging the testimonial, referred to its appropriateness, as, whenever he had occasion to consult it, he should always be reminded of this time, when he was surrounded by so many friends. A most effective speech was made by Mr. Crew on behalf of the meter inspectors, who alluded to the time when Leeds was supplied by two competing companies, and assured his hearers that although he was engaged in the opposing company to Mr. Jowett, he (Mr. Crew) and his fellow-workmen had even at that time the utmost respect for that gentleman. Speeches were also made by Messrs. Ogden (manager of the New Wortley Gas-Works), W. H. Gill (superintendent inspector), Adamson (representing the clerks), D. Dixon (on behalf of the collectors), Jones, Pounder, Lunn, and others, all endorsing the remarks of the chairman, after which the proceedings terminated, having been throughout of a most enthusiastic character.

Register of New Patents.

APPLICATIONS FOR LETTERS PATENT.

1799.—WALKINGTON, W., Leeds, "Improved automatic adjusting and deodorizing apparatus to be applied to closet-lids." May 14, 1875.

1809.—PRIOR, M., Sheffield, "Improvements applicable to compensating safety metallic pistons, valves, and anti-galvanic lubricant for same, applicable more especially to steam, water, air, or gaseous engines, to stuffing-boxes, to circular or piston valves, and to air and water pumps." May 14, 1875.

1815.—LOUTTIT, K. M'L. P., Greenwich, London, "Improvements in the construction of lamps, applicable also for heating purposes." May 15, 1875.

1816.—WALLACE, J., Durham, "A new and improved pump for pumping water, air, or gases." May 15, 1875.

1845.—ANDERSON, M. F., Edinburgh, "Improvements in the treatment of sewage." May 19, 1875.

1857.—TYLOR, A., Newgate Street, London, "Improvements in apparatus and arrangements for controlling, arresting, measuring, and recording the flow of liquids and fluids, and preventing the escape and waste of the same." May 20, 1875.

1865.—MORGAN-BROWN, W., Southampton Buildings, London, "Improvements in photometers, to be called the 'pocket photometer.' A communication. May 21, 1875.

1870.—HUGHES, R. H., Hatton Garden, London, "Improvements in self-acting valves." May 21, 1875.

1872.—BABLON, V., Paris, "Improvements in photometers or photo-phlogometers for measuring the intensity of the lighting power of gas in accordance with the size of the flame." May 21, 1875.

1888.—CLARK, A. M., Chancery Lane, London, "Improved processes for the manufacture of ammoniacal salts, and more particularly the sulphate of ammonia." A communication. May 22, 1875.

1891.—WOODALL, C., Vauxhall, and WILLS, T., Brixton, London, "Improvements in the means of and apparatus for the purification of gas." May 24, 1875.

1895.—HILLS, F. C., Deptford, London, "Improvements in the purification of gas, and in the preparation of materials to be used in the said purification." May 24, 1875.

GRANTS OF PROVISIONAL PROTECTION.

1662.—BUCHAN, W. P., Glasgow, "Improvements in water-closets." May 4, 1875.

1672.—WHITLEY, J., Leeds, "Improved mode of and arrangements for removing from sewers and dealing with deleterious gases." May 5, 1875.

1674.—LANDAU, M. I., Goulston Square, London, "Improvements in lamps and apparatus for lighting, also in apparatus for heating and cooking." May 5, 1875.

1692.—CREASY, J. T., Lambeth, and TULLY, W., North Bow, London, "An improved apparatus or machine for utilizing the pressure of water, air, gas, or other fluid as motive power." May 6, 1875.

1694.—WHITLEY, J., York, "Improvements in the purification of gas." May 6, 1875.

1701.—BROWN, H., Gray's Inn, London, "Improvements in apparatus for utilizing inflammable fluids for illuminating and heating purposes." May 7, 1875.

1709.—LAKE, W. R., Southampton Buildings, London, "Improvements in apparatus for expanding tubes." A communication. May 7, 1875.

1712.—HEINZERLING, C., and M'GOWAN, G., Glasgow, "A new or improved process for oxidizing anthracene, and improvements in the colouring matter produced therefrom." May 8, 1875.

1729.—GORDON, J., Glasgow, "Improvements in waste-preventing stop-cocks or valves." May 10, 1875.

1750.—MALLINSON, J., Welwyn, Herts, "Improvements in sluice and slide valves to regulate the flow of steam, water, and other fluids." May 11, 1875.

1752.—HALLSWORTH, S., and BAILES, R., Leeds, "Improvements in purifying illuminating coal gas, and in the preparation of the means employed therefor." May 11, 1875.

1760.—MONTGOMERY, R., Greenock, "A new or improved automatic apparatus for ejecting water or other fluids from steam cylinders, chests, and pipes or other vessels, conduits, or receptacles." May 11, 1875.

1762.—MUNRO, W., Glasgow, "A new or improved pump for forcing water, which may be used for extinguishing fires or for other purposes." May 11, 1875.

NOTICES TO PROCEED.

46.—BONNEFOND, A., Paris, "An improved meter or apparatus for measuring water and other liquids." Jan. 5, 1875.

50.—DEACON, G. F., Liverpool, "Improvements in apparatus for measuring the flow of water in pipes." Jan. 5, 1875.

55.—DICK, A., Cannon Street, London, "An improved compressed air or gas spring, and stuffing-box to be used in connexion therewith." A communication. Jan. 6, 1875.

94.—ROWLAND, E., Manchester, "Improvements in and apparatus for compressing air, and for raising and forcing liquids by the air so compressed, or by steam pressure, which improvements are partly applicable to measuring and indicating the quantity of liquid passing through the apparatus." Jan. 11, 1875.

101.—FYFE, D. A., and BOWERS, W. H., Manchester, "Improvements in the method of and in apparatus for producing gas or gases for heating and for illuminating purposes." Jan 12, 1875.

108.—HIGGINSON, A., Liverpool, "Improvements in motive-power engines, and in pumps." Jan. 12, 1875.

153.—NEWTON, H. E., Chancery Lane, London, "Improvements applicable to burners for lighting purposes." A communication. Jan. 14, 1875.

165.—COWPER, C. N., Edinburgh, "An improved economic method of heating towns and villages or sections thereof." Jan. 15, 1875.

175.—VERA, P., Colombia, South America, "Improvements in gas or hot-air engines heated by heat generated by chemical action igniting hydrogen and oxygen gases to form water." Jan. 16, 1875.

214.—BOX, J., Westminster, London, AUBERTIN, E., BOBLIQUE, L., and LEPLAY, H., Paris, "Improvements in the disinfection of solid and liquid matters, such as nightsoil, sewage, either together or separately, gas and other foul waters." Jan. 20, 1875.

The GRAND MEDAL of MERIT at the VIENNA EXHIBITION has been AWARDED to

GWYNNE & BEALE'S PATENT IMPROVED GAS-EXHAUSTERS,

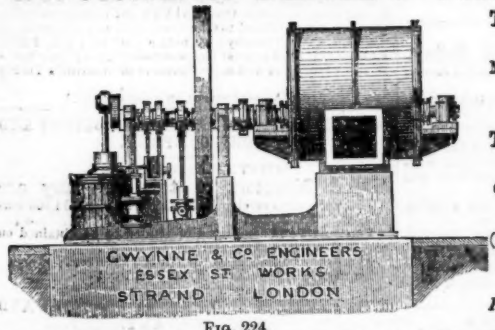


FIG. 224.

The BEST EXHAUSTERS IN THE WORLD.

Made under the personal superintendence of

Mr. BEALE,

The oldest Maker, Inventor and Patentee of

GAS-EXHAUSTING MACHINERY.

(It is NOT CORRECT to state that Mr. BEALE has RETIRED.)

Prices and every information on application.

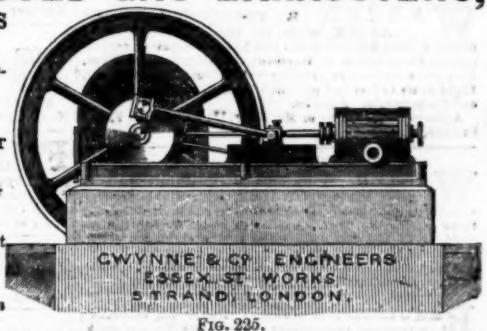


FIG. 225.

Fig. 224 represents one of those erected at the Imperial Gas-Works, Bromley, capable of passing 210,000 cubic feet of gas per hour. Several others of the same size are now on order for the same Company. These Patent Machines combine the highest quality of workmanship and materials, the largest bearings and wearing surfaces, with the most perfect system of action yet discovered. Fig. 225 represents one of a series of four at the Nottingham Gas-Works, each passing 62,500 cubic feet per hour. GWYNNE AND Co. *do not pretend to enter into a struggle with other makers in respect to cheapness. They have never sought to make price the chief consideration, but to produce Machinery of the very highest quality, and the most approved design and arrangement.* Their prices have been estimated with a due regard to the excellence of the article produced, and when this is taken into consideration, they have no fear for the result. The orders executed this season for Exhausters and alterations to their patented system amount to over 4,000,000 cubic feet of gas passed per hour, and to over 300 horse power for engines to drive them. In every instance their work is giving the greatest satisfaction. Numerous testimonials and references can be given.

REGULATORS, BYE-PASSES, STOP-VALVES, GAS-VALVES, & MACHINERY FOR GAS MANUFACTURE, OF ALL SIZES,

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GWYNNE & CO., HYDRAULIC & GAS ENGINEERS, ESSEX STREET WORKS, STRAND, LONDON, W.C.

G. & Co. are now manufacturing for a London Gas Company three of their 210,000 cubic feet Patent Gas Exhausters, and many of all sizes.

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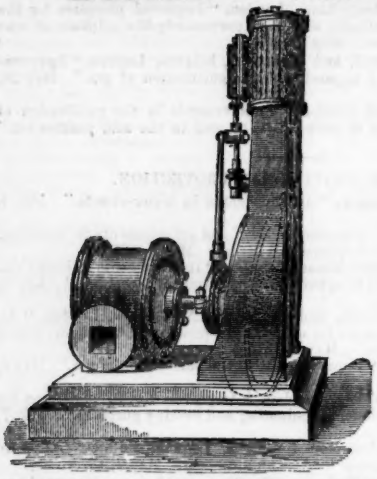
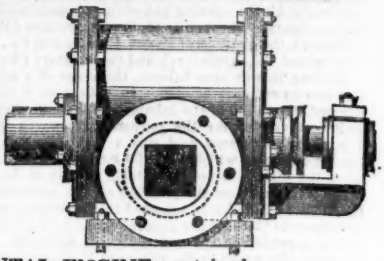


WITH

ENGINE COMBINED

ON

ONE BASE PLATE.



SOLE MAKERS,

GEORGE WALLER & CO.,

Who, since Mr. BEALE'S retirement, are the Oldest Makers.

EXHAUSTERS with HORIZONTAL ENGINE combined.
EXHAUSTERS with OUTSIDE BEARINGS.
MAKERS of ENGINES, BOILERS, and GAS MACHINERY.
TAR, LIQUOR, and SYPHON PUMPS. GAS-VALVES in stock, 2 to 30 inches.
SELF-ACTING BYE-PASS VALVES, with Lid and Relieving Lever.
MANN'S and many other descriptions of WATER DISTRIBUTORS.
SCRUBBERS, PURIFIERS, and CONDENSERS.
EXHAUSTERS from 3000 to 60,000, new and second hand, in stock.

PHŒNIX ENGINEERING WORKS, HOLLAND STREET, S.E., & at STROUD, GLOUCESTERSHIRE.

D. BRUCE PEEBLES & CO.,

ENGINEERS,

FOUNTAINBRIDGE WORKS, EDINBURGH,

MANUFACTURERS OF WET AND DRY GAS-METERS;

Patentees and Sole Manufacturers of PEEBLES' LAMP-GOVERNORS,

ABOVE 30,000 OF WHICH ARE NOW IN USE.

"These Lamp-Governors are so superior that they are likely to supplant all others."—*Dr. Wm. Wallace, F.R.S., F.C.S.*

D. BRUCE PEEBLES AND CO., FOUNTAINBRIDGE WORKS, EDINBURGH.

WOTTON-UNDER-EDGE GAS-WORKS.

WANTED, a competent Working MANAGER.

Apply to Mr. H. CLARK, Secretary.

WANTED, a good steady Mechanic, who is accustomed to erecting gas apparatus and machinery.

Apply, by letter only, stating where formerly employed, to No. 161, care of Mr. King, 11, Bolt Court, Fleet Street, LONDON, E.C.

WANTED, a situation as Manager of Gas-Works. Fifteen years experience. Six years in last situation, where the make was from 15 to 20 millions per annum. Has a thorough knowledge of main and service laying, &c., and the general routine of gas-work.

Address No. 160, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, by a Gas Engineer and Manager, a RE-ENGAGEMENT. Thoroughly competent in every branch of his profession. For a number of years Manager for a large provincial Gas Company. The highest testimonials and references given. No objection to go abroad.

Address No. 157, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a Draughtsman in a Gas Engineer's Office. He must be able to get out quantities and make up estimates, and have a thorough knowledge of all gas apparatus.

Apply, by letter, enclosing copies of testimonials, stating salary required, to No. 158, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, a re-engagement as MANAGER, where the make is from 6 to 12 millions. The Advertiser has had 20 years practical experience in the erection, management, and distribution of gas. Five years foreman in erecting works (home and foreign). Eight years in last and present situation. Good references and testimonials. Aged 39.

Address No. 156, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

TO WORKING MANAGERS.

WANTED, a Man to superintend a small country Gas-Work, with eight fire-clay retorts. Single handed four months in summer, when only three retorts are used. A man to assist during the remainder of the year, when the whole eight are going. Cottage on the works, with coals and gas, rent free.

Apply, stating salary expected, together with references, to G. B. CLARKE, Secretary, Gas Company, Woburn, BEDS.

REQUIRED, a steady man as Stoker; permanent engagement. Wages 24s. 6d. per week; overtime paid. Certificates of good character and ability required.

Apply to Mr. T. H. BOUTTELL, Gas-Works, SLEAFORD.

NEW EDITION, NOW READY,

ADVANTAGES OF GAS FOR

COOKING AND HEATING.

By MAGNUS OHREN, A.I.C.E., F.C.S.

For Companies to issue to their Gas Consumers.

Specimen Copy by post Threepence, direct from MAGNUS OHREN, Gas-Works, Lower Sydenham, London, S.E.

WANTED, for the San Paulo Gas- Works, Brazil, a young Man to act as UNDER FOREMAN. He must be capable of keeping the yard accounts, and able to take the Foreman's place in case of need.

Address, with copies of testimonials, to W. SOUTHALL, Esq., Secretary, Pinner's Hall, Great Winchester Street, LONDON, E.C.

THE Advertiser, a respectable young Man, requires a situation as FOREMAN, or to manage a branch establishment. Understands the manufacture of gas-fittings in all its branches, and could work at same if required. Country preferred. Good references, 16 years experience.

Address J. B., 2, Buxton Place, Lambeth Road, LONDON.

THE Advertiser, aged 28, having over eleven years experience in gas manipulation, desires a re-engagement, either as MANAGER or Assistant Manager in large works. Has lately returned from abroad, and has no objection to proceed abroad again. Good testimonials.

Address No. 159, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

MALDON GAS COMPANY, LIMITED.

WANTED, a second-hand cast-iron Gas- PURIFIER of from 6 to 8 ft. square, and 3 to 3 ft. 6 in. deep.

Apply, with price and particulars, to HENRY CLARKE, Secretary.

FOR SALE—Four Dry Lime Purifiers, each 10 ft. by 8 ft. by 3 ft., with 8-in. connexions, centre-valve, lifting apparatus, &c., complete.

Particulars may be had on application to G. E. SAVILLE, Manager, Gas-Works, SOWERBY BRIDGE.

TO GAS MANAGERS.

FOR SALE—Ten 15-in. round Retort MOUTHPIECES, with wrought-iron lids and screws complete, in good condition.

Apply to Mr. THOMAS WILKINSON, Manager, Gas-Works, Newmarket, SUFFOLK.

FOR SALE—A 4-horse Engine and Ex- HAUSTER, to pass 10,000 cubic feet per hour. Self-acting bye-pass and two gas-valves, 8-in. connexions and exhauster governor.

For further particulars, or to view the same now working, apply at the GAS-WORKS, WALTON-ON-THAMES.

ON SALE, by Private Treaty, a small Gasholder, Retort, Purifier, and usual fittings.

Apply to Tawd Vale Colliery Company, Limited, Skelmersdale, near ORMSKIRK.

TAR AND AMMONIACAL LIQUOR.

THE Directors of the Bedford Gaslight Company are prepared to receive TENDERS for their surplus TAR, also for their AMMONIACAL LIQUOR, at the Bedford Gas-Works, Bedford.

The Contract to commence the 1st of July, 1875, and to be for two years.

The tenders to be sent in on or before the 22nd day of July, 1875, and at a price per ton, or per cask of 36 gallons.

The Works are connected by a siding to the Midland and London and North-Western Railways.

Any further particulars may be obtained on application to W. H. SMITH, Engineer, at the Works.

The Directors do not bind themselves to accept the highest or any tender.

ON SALE, at the Doncaster Corporation Gas-Works, a STATION-METER complete, with clock, bye-pass, and hydraulic valves. Also a Governor, with two 10-in. slide-valves. These apparatus are to be sold solely in consequence of being too small for present and future use in their present situations.

The Station-Meter is in good repair, was made by West and Gregson, and has worked most satisfactorily to the present time, passing occasionally 12,000 cubic feet per hour.

The Governor is in good repair, and has worked quite satisfactorily to the present time, regulating the supply of gas for a consumption of 250,000 cubic feet per day of 24 hours.

Tenders for the Station-Meter and Governor, either together or separate, to be addressed to Mr. Alderman Dunhill, Chairman of the Gas Committee, on or before the 10th day of June next, endorsed "Tender for Station-Meter," or "Tender for Governor."

The undersigned will give any information as to the quality of the two instruments.—By order,

SAMUEL DARWIN, Engineer and Manager.

May 7, 1875.

The Committee do not bind themselves to accept the highest or any tender.

ALDERSHOT GAS AND WATER COMPANY.

THE Directors are prepared to receive TENDERS for the supply of 1000 yards of 8-in. Iron GAS-MAIN, "Coated," to be delivered free at the Aldershot station, London and South-Western Railway, on or before the second week of September next.

Tenders to be sent in not later than Wednesday morning, June 9.

Office, Victoria Road, Aldershot.

WOLSTON'S TORBAY IRON PAINTS.

THE Torbay and Dart Paint Company, Limited, 23, Great George Street, Westminster, S.W., having been informed that PAINTS not manufactured by them are being offered to Gas Companies and the public as "WOLSTON'S," hereby give notice that they will TAKE PROCEEDINGS against any persons infringing their rights as sole proprietors and manufacturers of Wolston's Torbay Iron Paints.

(See Advertisement on another page.)

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

CONTRACT FOR COAL.

THE Directors of this Company are prepared to receive TENDERS for about 14,000 tons of GAS COAL.

Particulars and conditions of tender to be obtained on application to the SECRETARY at the Works.

Tenders to be sent in by the 7th of June prox.

North Street, Wandsworth, May 25, 1875.

WANDSWORTH AND PUTNEY GASLIGHT AND COKE COMPANY.

TAR AND LIQUOR CONTRACT.

THE Directors of the above Company are prepared to receive TENDERS for the TAR and AMMONIACAL LIQUOR produced at their works, at Wandsworth, during the next twelve months. The Tar and Liquor to be removed by the Contractor, by barges, whenever required by the Company's Engineer. Monthly cash payments to be made.

The Directors do not bind themselves to accept the highest or any tender.

Tenders, marked "Tender for Tar," &c., to be sent on or before the 7th of June prox.

North Street, Wandsworth, May 25, 1875.

BRITISH
ASSOCIATION OF GAS MANAGERS.

ANNUAL MEETING OF MEMBERS.

CIRCULAR OF ARRANGEMENTS.

THE

TWELFTH ANNUAL GENERAL MEETING

OF THE MEMBERS OF THIS ASSOCIATION WILL BE HELD ON

TUESDAY, WEDNESDAY, & THURSDAY, the 8th, 9th, & 10th of June, 1875,

AT THE

LECTURE HALL OF THE LEEDS PHILOSOPHICAL SOCIETY,

PARK ROW, LEEDS.

JAMES PATERSON, ESQ., F.C.S., PRESIDENT,

Will occupy the Chair.

ORDER OF PROCEEDINGS.

TUESDAY, JUNE 8, 1875.—Morning Meeting.

The Chair to be taken at Eleven o'clock.

Inaugural Address by the President. | Admission of New Members.
Reading of Papers and Communications.

Evening Meeting.

A Lecture will be delivered at the Lecture Hall of the Leeds Philosophical Society, by A. VERNON HARCOURT, Esq., M.A., F.R.S., Lee's Reader of Chemistry at Christ Church, Oxford; Metropolitan Gas Referee, &c., &c.; On "Experimental Inquiries concerning the Purification and Illuminating power of Coal Gas." The chair will be taken at Half-past Seven o'clock.

WEDNESDAY, JUNE 9, 1875.

The Chair to be taken at Eleven a.m.

Reading of Papers and Communications, and the Transaction of other Business.
Election of Officers for ensuing Year, &c.

At Six p.m. the Members and Friends will dine together at the Queen's Hotel, Wellington Street, Leeds. Tickets for the Dinner, 7s. 6d. each, may be had from the Secretary, if taken on or before the 8th of June. After that date 10s. will be charged.

THURSDAY, JUNE 10, 1875.

An Excursion by Rail from Leeds to Ripon, thence by conveyances, to be furnished, to Studley Royal and Fountains Abbey, where a luncheon will be provided. Return by the same route and conveyances. This arrangement may be varied to suit contingencies.

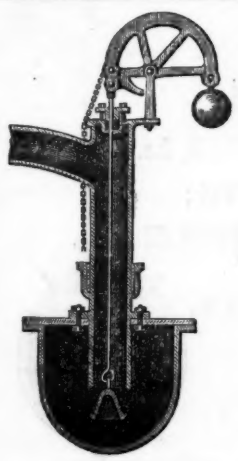
LIST OF PAPERS AND COMMUNICATIONS

TO BE SUBMITTED TO THE MEETING.

The Order in which the Papers are Read will be determined by the Committee prior to the Meeting, so as to suit the general convenience.

"Hills's Liquor Process for Purifying Gas." By Mr. GEO. LIVESEY, of London.
"Water Gas: Its Manufacture and Value." By Mr. R. P. SPICE, of London.
"Building and Heating Retorts." By Mr. GEORGE ANDERSON, of London.
"Retort Settings, with Special Regard to the Construction of Furnaces and Economization of Fuel." By Mr. JOHN TINDALL, of Walsall.
"A New System of Railway Lighting." By Mr. W. SUGG, of London.
"Systematic Testing of Consumers Meters." By Mr. JOHN DOUGLAS, of Portsea.
"Mechanical Stoking." By Mr. S. H. WARREN, of Crewe.
"Economy of Force in Gas-Works in Reference to Condensing, Exhausting, and Scrubbing." By Mr. WM. CLELAND, of Linacre, Liverpool.
"Station Governors for Gas-Works." By Mr. WILLIAM KEY, of Accrington.
"The Necessity of all Public Lamps being Supplied by Meter, and the Profits derivable from this System." By Mr. WM. BATES, of Worksop.
"Public Lighting." By Mr. T. A. SKELTON, of London.

May 22, 1875. WILLIAM H. BENNETT, *Secretary.*



BOX'S
PATENT ANTI-DIP VALVE

Affords a clear gas way through the dip-pipe while the retort is in action, and produces a perfect seal at pleasure, or whenever the retort is open, offering great security against the drawing of air, and obviating the necessity for using any liquid in the now so-called hydraulic main. It is easy of application to existing apparatus, and is comparatively inexpensive. Is not likely to get out of order, as the tar, which will adhere to the botton of the dip-pipe and the flange of the cone, both of which are faced, will act as a lubricant, and prevent undue wear and tear. The whole, as will be seen on inspecting the accompanying illustration, is exceedingly simple, and every part accessible. To adapt it to the present dips, all that is necessary is to face the bottom edge of the dip-pipe, and suspend a cone by a rod, which passes through the bonnet, the raising and lowering of the cone being performed through the intervention of a weighted eccentric.

The Patentee is prepared to supply Patented Apparatus upon the most moderate terms, and will be happy to reply to any inquiries that may by adddressed as under—

W. BOX,
GAS-WORKS, CRAYFORD, KENT

THE Scarborough Gas Company have FOR SALE, in consequence of removing to their New Works, a first-class Telescope GASHOLDER, 52 ft. in diameter and 44 ft. deep. It was made and erected by C. and W. Walker, of Donnington, in 1868, and is in excellent condition. It is of remarkably good workmanship, being perfectly circular and true, and free from all irregularities. The columns and girders are of handsome design and highest class of work.

Gas Companies wanting a good Gasholder this year will find this an advantageous opportunity.

For further particulars apply to
JAMES MOON, Gas Engineer, Scarborough.

AMMONIACAL LIQUOR.

THE Directors of the Barnsley Gas Com- pany are prepared to receive TENDERS for the AMMONIACAL LIQUOR produced at their works in Barnsley, and at Old Mill, for a period of One or Three years, from the 1st day of July next.

Probable quantity, and any other particulars, may be had on application to the undersigned.

Tenders, addressed to the Chairman, to be sent to me not later than Thursday, the 3rd day of June, 1875.

JOHN HUTCHINSON, Manager.

Gas Office, Barnsley, May 22, 1875.

SALISBURY GASLIGHT & COKE COMPANY.

THE Directors of the above Company are prepared to receive TENDERS for the purchase of the surplus TAR, from their Works at Fisherton Anger, from the 1st of July, 1875, for a term of One year.

Also for such quantities of AMMONIACAL LIQUOR as they may have to dispose of at their Works as above for a like term.

The Directors will not be bound to accept the highest or any tender.

For further particulars apply to the Manager, at the Gas-Works.

Sealed tenders should be addressed to the Secretary (marked tender for "Tar" or "Liquor") on or before the 15th day of June.

E. F. KELSEY, Secretary.

The Close, Salisbury, May 30, 1875.

HINDLEY LOCAL BOARD.

WATER-WORKS.

THE Local Board for the district of Hindley are prepared to receive TENDERS for a supply and delivery at Hindley of 3480 yards of 12-in. and 780 yards of 9-in. PIPES, together with Junction-Pipes and other special castings required.

Copies of specifications can be obtained, and plans can be seen, on application to the undersigned, on and after the 18th inst.

Tenders to be sent in on or before the 5th of June next, endorsed "Tender for Water-Pipes," and addressed to the Chairman of the Board.

The Board do not bind themselves to accept the lowest or any tender.

By order,
STEPHEN HOLT, Clerk to the Board.

Offices, Cross Street, Hindley, May 13, 1875.

TO COLLIERY PROPRIETORS AND OTHERS.

THE Oldham Corporation Gas and Water Works Committee are prepared to receive TENDERS for a supply of about 47,000 tons of CANNEL and COAL.

Particulars may be obtained on application to Mr. Herbert Andrew, Gas and Water Offices, Oldham.

Tenders to be sent in on or before Tuesday, June 8, 1875.

By order,
H. BOOTH, Town-Clerk.

Oldham, May 13, 1875.

TENDERS FOR COALS.
SPECIFICATION.

THE Derby Gaslight and Coke Company are prepared to receive TENDERS for the supply of 24,000 tons of SOFT COALS and SOFT COBBLES or NUTS, to be divided into three contracts, of 8000 tons each; and to be delivered in the following monthly quantities, viz.:—

1875—	June	400
	July	400
	August	500
	September	900
	October	1000
	November	1000
	December	1000
1876—	January	900
	February	900
	March	500
	April	500
	Total of each contract	8000

The Company will undertake to receive from the party or parties contracting the total quantity of 24,000 tons, in one, two, or three contracts, as the Board may decide; but they do not bind themselves to accept the lowest or other tender or tenders, until after a satisfactory trial of the Coals and Cobbles or Nuts to which such tender or tenders may relate shall have been made. They are to be the best of their kind, and as free as possible from sulphur, bats, bind, refuse, and dirt, and shall be weighed upon a correctly adjusted machine.

Payments will be made monthly, if and so long as the contracts shall be duly fulfilled, to the extent of nine-tenths of the amount of the invoices, and the balance will be discharged on the satisfactory completion of the contract.

Sealed tenders (to be made on forms obtainable at the Company's Office), specifying the description of Coals and the pits at which they are to be raised, and stating the prices for delivery by canal at Derby at the new Gas-Works, adjoining the Midland Railway Company's premises, or at the canal wharf, and also the price delivered at either of the Midland Railway Stations, Derby, and in manner and subject to the conditions aforesaid, must be delivered at the Offices of the Company, Friar Gate, on or before Saturday, the 5th day of June next.

The respective contracting parties will be required to execute an agreement to be prepared by, and to the satisfaction of, the Secretary of the Company.

By order of the Directors,
ISAAC FISHER, Secretary.

Derby Gas Office, May 22, 1875.

THOMAS ALLAN & SONS, of Spring- bank Iron-Works, Glasgow, manufacture small cast-iron GAS AND WATER PIPES, 1½ to 6 inches, at their branch works, Stockton-on-Tees, and have at present a large stock, which they are open to sell at moderate prices.

IMPERIAL CONTINENTAL GAS ASSOCIATION.

(INCORPORATED BY ACT OF PARLIAMENT.)

The HALF-YEARLY ORDINARY MEETING of the Imperial Continental Gas Association was held at the City Terminus Hotel, on TUESDAY, the 25th inst.

Proposed by the President, Sir Moses Montefiore, Bart., F.R.S., and resolved unanimously—"That Mr. Julian Goldsmid, M.P., do take the chair."

Mr. Julian Goldsmid, M.P., thereupon having taken the chair,

The following Resolutions were passed:—

Resolved unanimously—"That the report upon the affairs of the Association now read be received, adopted, and entered on the minutes."

Resolved unanimously—"That a dividend of £2 per share be declared upon the 56,000 shares of the Association, for the half year ending the 31st of December last; and that the said dividend be payable, free of income-tax, on and after the 15th of June next."

Resolved unanimously—"That Julian Goldsmid, Esq., M.P., be re-elected a Director of the Association."

"That Colonel Josiah Wilkinson be re-elected a Director of the Association."

"That Philip Twells, Esq., M.P., be re-elected a Director of the Association."

"That Joseph Sebag, Esq., be re-elected an Auditor of the Association."

"That the cordial thanks of the meeting be given to the President and Directors for their able management of the affairs of the Association, and to the Chairman for his conduct in the chair this day."

Upon the motion of the Chairman, Mr. Julian Goldsmid, M.P., which motion was seconded by Sir Moses Montefiore, Bart., a vote of thanks was also given to Mr. G. W. Drory, the General Superintendent of the affairs of the Association on the Continent, and to the Agents, Engineers, and other Officers of the Association.

By order of the Board of Direction,
ALBERT F. JACKSON, Secretary.

30, Clement's Lane, Lombard Street, London,
May 28, 1875.

Now ready, price 7s., by Post 7s. 3d.,
A SECOND EDITION (fcap. 8vo., morocco gilt)
OF
THE GAS MANAGER'S HANDBOOK,
CONSISTING OF
Tables, Rules, and Useful Information for Gas Engineers, Managers,
And others engaged in the Manufacture and Distribution of COAL GAS.
By THOMAS NEWBIGGING, A.I.C.E.

WILLIAM B. KING, 11, BOLT COURT, FLEET STREET, LONDON, E.C.

IN THE MATTER OF BRONNER'S PATENT BURNERS.

NOTICE is Hereby Given that Julius Brönner, on the 20th of April, 1875, in a suit in Chancery, 1874, B 365, obtained an injunction perpetually restraining the Defendant, his Agents, Servants, and Workmen, from in any way advertising or offering for sale, or selling, or from in any manner causing to be advertised, or offered for sale, or sold as "Real Brönner," or "Brönner," or "Broebner" Burners, any Burner not manufactured by or for the Plaintiff, Julius Brönner, or by his Agents.

JACKSON, FOX, AND ELLEN,
55, Chancery Lane, London,
Solicitors for the Plaintiff,
JULIUS BRÖNNER, Frankfort-on-Maine.

BAILEY'S Patented Inventions are now in extensive use wherever steam is known. Bailey's Patent Steam Gauges, Pyrometers, Water Gauge Cocks, Test Pumps, Fusible Plugs, Steam and Water Valves, Safety Valves, Junction Valves, Pumps, Tell-Tales, Recorders, Lightning Conductors, Electric Telegraphs, Turret Clocks, Steam Joint Cement, Lifting Jacks, Boiler Feeders, Lime Catcher and Separator, Injectors and Ejectors, and every description of first-class Brass Work for Engines and Boilers. Gas-Works Managers who have not our large book should send for it.

16th edition, 1000 engravings, 4to., post free 2s. in stamps, weight 10 oz., cost of production £1000,

BAILEY'S Illustrated Inventions, containing details and prices of goods in our five several departments:—(1) Brass Foundry, Steam Gauges, Indicators, Feeders, and Fittings; (2) Engineers Sundries, Small Tools, and Stores; (3) Machine Pump and Fire Engine; (4) Turret Clock, &c.; (5) Electric Telegraph, A B C Instruments, Bells, and Apparatus.

J. BAILEY and Co., Albion Works, Salford, LANCASHIRE.

Mr. NORWOOD EARLE,
GAS SURVEYOR,
12, QUEEN VICTORIA STREET, E.C.,

Advises on all matters connected with the Distribution of Gas, Public Lighting, Gas Testing, &c.

Valuations made for Assessment and other Purposes.

Mr. ALFRED LASS,
60, CORNHILL, LONDON, E.C.,

Is prepared to open the Books, and, if necessary, keep the Accounts of Gas and Water Companies.

To examine the Books and Accounts, and prepare Balance-Sheets for the information of Directors.

To assist Secretaries in preparing Balance-Sheets, according to the "Gas-Works Clauses Act, 1871;" or may be consulted with respect to Accounts generally.

WM. RICHARDS,
INVENTOR OF THE DRY GAS-METER,
REVISER OF "HUGHES ON GAS-WORKS,"
CONSULTING GAS ENGINEER,

Advises on all matters of business connected with Gas Lighting. Furnishes Working Drawings of Retort-Settings, Specification of Works, complete or in detail.

11, ST. MICHAEL'S ROAD, STOCKWELL, LONDON, S.W.

TO INVENTORS AND PATENTEES.

MR. W. H. BENNETT, having had considerable experience in matters connected with Gas, Water, and Sanitary Improvement, begs to say that he continues to assist Inventors in the perfection of their designs, and to obtain for them PROVISIONAL PROTECTION, whereby their invention may be secured for Six Months; or LETTERS PATENT, which are granted for Fourteen Years.

Patents completed, or proceeded with at any stage, thereby rendering it unnecessary for persons resident in the country to visit London.

Patents procured for Foreign Countries.

Information as to cost, &c., supplied gratuitously upon application to the Advertiser, 42, Parliament Street, WESTMINSTER.

JAMES OAKES & CO.,
ALFRETON IRON-WORKS, DERBYSHIRE,
AND
WENLOCK IRON WHARF, 20 & 22, WHARF ROAD CITY ROAD, LONDON, N.,

Beg to inform Gas and Water Companies and the public, that they keep in stock in London all the CASTINGS in general use in Gas and Water Works, including Iron Retorts, Socket and Flange Pipes, Bends, Branches, and Syphons of all sizes, Lamp Columns, &c., &c.

N.B.—Orders for Cast-Iron Tanks, Girders, Columns, Cylinders, and all irregular castings, will have immediate attention.

CHARLES HORSLEY, Agent.

HOPKINS, GILKES, & CO.,
LIMITED,
MIDDLESBOROUGH,

SUPPLY GAS & WATER PIPES of EVERY SIZE.
Plain, Turned and Bored, and Coated.
CAST-IRON RETORTS.
Castings for Gas-Works of every description.
EXHAUSTERS.

LONDON OFFICE: 25, LAURENCE POUNTNEY LANE.

COST PRICE SHEETS.

MANUFACTURE AND DISTRIBUTION OF GAS. These sheets are the same as were laid before the Dublin Meeting of the British Association of Gas Managers; but in the REPRINT, NOTES have been added for the guidance of those using them. Copies of the two sheets may now be had, price 5s.

South Shields. W. J. WARNER.

WATER-MAINS.

COTTERILL'S PATENT STEEL TUBE-DRILLS, for connecting services to water-mains, *under pressure*, without turning off the water. They drill and tap themselves, and are left in the mains. Made of all sizes, from ¾ to 2 inches and upwards. They cost less than the ordinary plan.

Apply to CHARLES FORSTER COTTERILL, Cannock, STAFFORD, Patentee.

OXIDE OF IRON.—We are prepared to supply, on moderate terms,
HYDRATED PEROXIDE OF IRON (BOG OCHRE),
Same quality as supplied by us to several of the most extensive Gas Companies, and which has given entire satisfaction.
FRANCIS RITCHIE & SONS,
BELFAST.

BIRTLEY IRON WORKS,
CHESTER-LE-STREET,
DURHAM.

Manufactory for every description of Casting and Machinery for Gas-Works and Water-Works.

Warehouse in London for Cast-Iron Pipes and Connexions of all sizes and in any quantity, Scott's Wharf, Bankside, Southwark.

Agent in London, Mr. J. MANWARING, 101 Cannon Street, E.C.

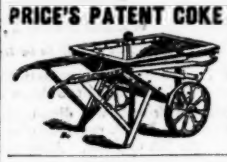
GARSIDE'S IMPROVED REGISTERED TUBE-VICE, holds all sizes of Wrought-Iron and Brass Tubes, from a 2-in. socket to the smallest brass tube made.

GARSIDES IMPROVED MAIN DRILLING CLIP, made in two sizes, to drill from 2-in. to 6-in. Mains, and from 6-in. to 12-in. Mains.

The above tools are made light and handy.

For drawings, &c., apply to the maker, SAMUEL GARSIDE, Gatefield Iron-Works, ASHTON-UNDER-LYNE.

PRICE'S PATENT COKE & COAL BARROW.



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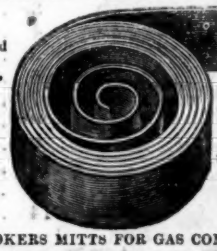

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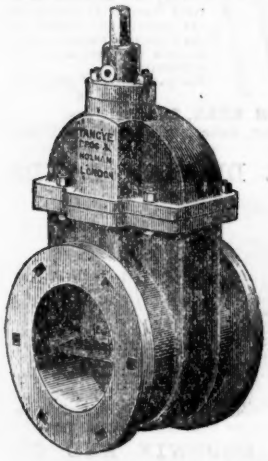

Inch.	s.	d.
2½	24	0
3	27	0
4	36	0
5	45	0
6	54	0
7	63	0
8	80	0
9	90	0
10	100	0
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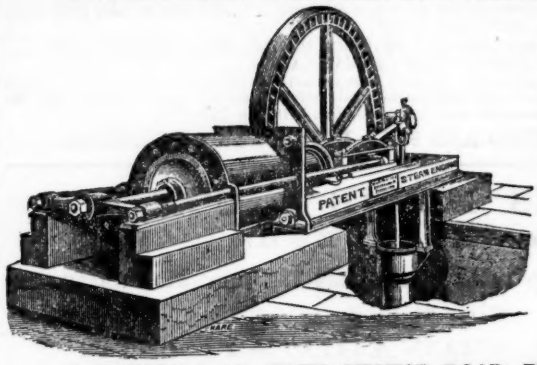

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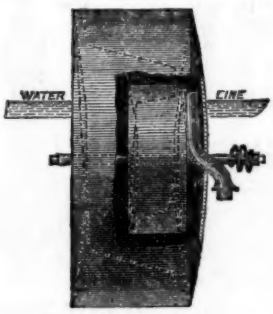

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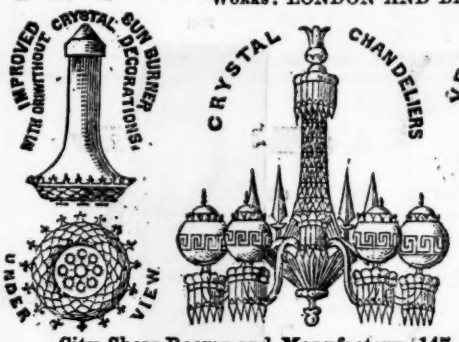

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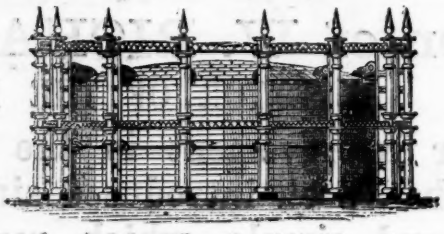

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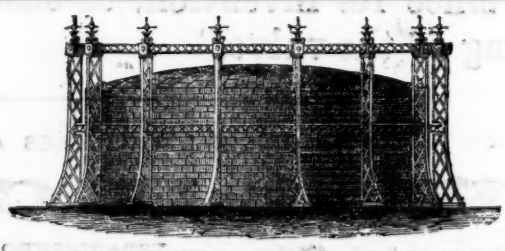

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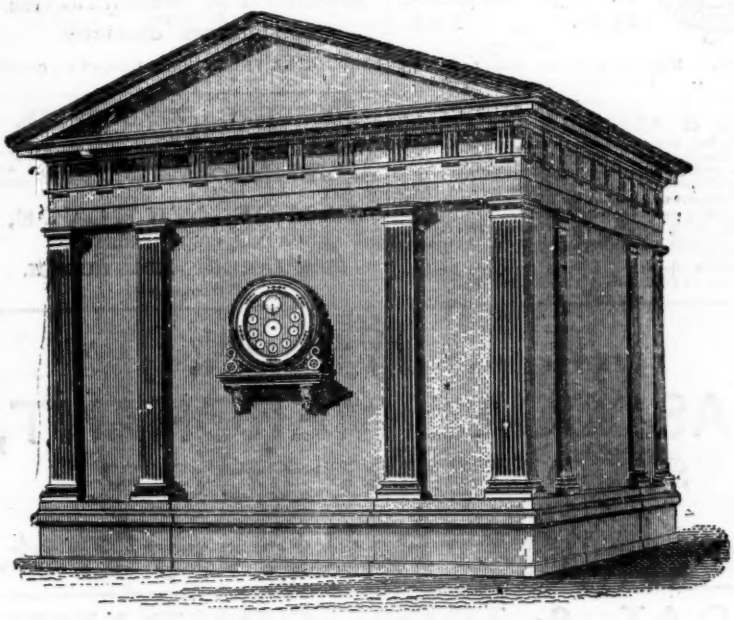

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Analysis by F. J. EVANS, Esq., Chartered Gas Company, Horseferry Road, Westminster:—
(COPY.)

	Cubic Feet of Gas per Ton of Coal.	Illuminating Power in Candles.	Coke per Ton of Coal used.	Ash in Coke, per Cent.	Sulphur in Coal, per Cent.
Silkstone Nuts . . .	10·800	15·85	12·66 cwt.....	6·0	0·69

NOTE.—The illuminating power of the gas was tested by the standard burner now used in London by the Gas Referees, under the City of London Gas Act, 1868.
Horseferry Road, Westminster, March, 1870. (Signed) F. J. EVANS.
These Nuts are extensively used by various Gas Companies throughout the Kingdom, who bear strong testimony to their value.
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1. The following are the practical results given by Dr. Wallace, of Glasgow, of analyses of their Lochore and Capledrae Cannels:—

	Sample worked at Capledrae.	Sample worked at Lochore.
Gas per ton of coal, at 60° Fahr. and 30 inches barometric pressure . .	13,095 cubic feet.	11,760 cubic feet.
Illuminating power, in standard sperm candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	32·91	34·83
Value of 1 cubic foot of gas in grains of sperm	780	836
Equivalent of a ton of coal in pounds of sperm candles	1,459	1,404
Durability of 1 cubic foot by 5-inch flame	69 minutes.	71 minutes.
Gravity of the gas (air = 1000)	596	594

Remarks.—This (the sample from Capledrae) is a Cannel Coal of first-class quality, giving 13,000 feet of 33-candle gas. It contains only a minute proportion of sulphur, and the ash is almost quite white. The coke is of rather inferior quality.

Remarks on Sample from Lochore.—This is a Cannel Coal of first-class quality, giving a large yield of very rich gas and a coke of medium quality.

2. The following are the practical results of analyses by Dr. Wallace of the Company's Waverley Cannels:—

	Capledrae Waverley.	Lochore Waverley.
Gas per ton of coal, at 60° Fahr. and 30 inches barometer	9,120 cubic feet.	11,145 cubic feet.
Illuminating power, in standard candles, by union jet consuming 5 cubic feet per hour, at ·5-inch pressure	36·62	33·09
Value of 1 cubic foot of gas in grains of sperm	878	794
Equivalent of a ton of coal in pounds of sperm candles	1,145	1,264
Durability of 1 cubic foot of gas by 5-inch flame	80 minutes.	67 minutes.
Gravity of the gas (air = 1000)	677	597

Remarks on the Sample of Capledrae Waverley.—This Coal gives fully 9000 feet of gas of 36½ candles, and is admirably adapted for bringing up the quality of gas made from common coal or inferior qualities of cannel. The tests were made at a rather high temperature, this being one of the coals that stand a very high heat without serious diminution of the illuminating power of the gas The coke contains 60 per cent. of ash, and is therefore almost valueless, but the proportion of sulphur is very moderate.

Remarks on the Lochore Waverley.—This is a first-class Cannel Coal, giving 11,000 cubic feet of 33-candle gas. The quantity of sulphur is very minute, and the ash is nearly white. The coke is of inferior quality, but not wholly valueless.

Applications for full Copies of Analyses and Prices may be made to the Company, at

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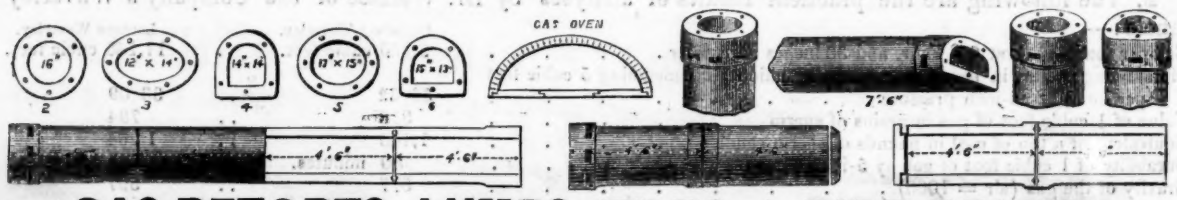

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